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KOSTIK (F. D.). О специализации бактерий возбудителя гоммоза Хлопчатника **Ps. malvacearum.** [On the specialization of the bacterium causing gummosis of Cotton, *P. malvacearum*.]—Сб. тр. Молд. ст. Всес. ин-та защ. раст. [*Sborn. Trud. Mold. St. vsesoyuz. Inst. Zashch. Rast.*], *1957*, 2, pp. 61–69, 1957. [Abs. in *Referat. Zh. Biol., 1958*, 16, p. 212, 1958.]

At the Moldavian Institute for Plant Protection inoculation of susceptible and resistant vars. of cotton, kenaf [*Hibiscus cannabinus*], Chinese bell flower [*Abutilon* sp.], *Phaseolus mungo*, beans [*P. vulgaris*], and soybean with *Pseudomonas* [*Xanthomonas*] *malvacearum* [**37**, p. 586], by introducing a dense suspension of the bacterium into wounds on the leaves or by vacuum-infiltration, induced infection only in cotton. When after 1, 2, 5, and 10 days isolations were made from the inoculated plants only those from cotton were positive. It is suggested that the plant sap possesses properties antibiotic to the pathogen. *X. malvacearum* was cultured on agar with sap from these plants at 1:2 and 1:5 or in potato agar suspension to which the bacterial culture, previously autoclaved or filtered through a Chamberlain candle, had been added, and left for 24 hr. at 24–25° [C.]. The results confirmed the presence of antibiotic properties in all the plants, but in cotton they were negligible. The author considers that the anatomical structure of the plant plays only a secondary role in resistance to the parasite.

STETTMEIER (W.). **Die Anwendung von Pflanzenschutzmitteln im Blumen- und Zierpflanzenbau.** [The use of plant protectives in the cultivation of flowers and ornamentals.]—*Pflanzenschutz*, **10**, 12, pp. 135–137, 1958.

This review from the Bayer. Landesanstalt für Pflanzenbau und Pflanzenschutz, Außenstelle Würzburg, Germany, includes notes on the use of some fungicides (Cu, S, karathane, zineb, captan, quinone derivatives) and a list of common diseases and the materials suitable for their control.

TERRIER (C.). **Veronica campylopoda Boiss., hôte nouveau de Schroeteria decaisneana (Boud.) de Toni.** [*V. campylopoda*, a new host of *S. decaisneana*.]—*Ber. Schweiz. bot. Ges.*, **68**, pp. 50–53, 1958.

The infected plants were growing in the garden of the Institut de Botanique, University of Neuchâtel, Switzerland, in 1957.

GARGA (R. P.). **Studies on virus diseases of plants in Madhya Pradesh. I. Green rosette of Vinca.**—*Curr. Sci.*, **27**, 12, pp. 493–494, 1 fig., 1958.

At the Dept of Botany, Holvar College, Indore, wedge grafting of diseased *V. rosea* on healthy plants grown from seed and kept under insect-proof conditions caused the grafted plants after 4–6 weeks to produce tufts of smaller leaves, with thin laminae, which gave a rosette appearance. The abnormality is attributed to a virus. Several attempts to transmit the disease by sap inoculation failed. Attempts at transmission to groundnut were not successful, though the disease resembles to some extent the green rosette of groundnut reported to infect *Vinca* in the Gambia [**11**, p. 697].

FRANK (E.). **Praktischer Pflanzenschutz im Grassamenbau.** [Practical plant protection in grass seed production.]—*Pflanzenschutz*, **10**, 10, pp. 111–113, 1958.

This paper from the meeting of the Commission of Plant Protection, Germany, includes reference to the control of several fungal diseases of grasses by seed disinfection. Infection by *Helminthosporium* (including *H. vagans*) and *Marssonina*

is well controlled in the 1st yr. by sowing treated seed, but subsequently builds up; affected stands should, therefore, not be used for seed production for longer than 2–3 yr.

Fiedler (R.). **Arbeiten auf dem Gebiet des Pflanzenschutzes im Grassamenbau in Niederbayern.** [Work in the field of plant protection in grass seed production in Lower Bavaria.]—*Pflanzenschutz*, **10**, 10, p. 114, 1958.

In this primarily entomological note it is recorded that plots of Deutschem Weidelgras (*Lolium* sp.), sprayed on 12 Nov. 1957 with brassicol super at 20 kg./ha., made a more rapid recovery from post-winter infections of *Fusarium* and *Typhula* than did unsprayed plots.

Nielsen (E. L.) & Dickson (J. G.). **Evaluation of Timothy clones for stem rust reaction.**—*Agron. J.*, **50**, 12, pp. 749–752, 2 fig., 1958.

In these studies on *Puccinia graminis* var. *phlei-pratensis* [cf. **4**, p. 30] at the Crops Research Division and the Wisconsin Agricultural Experiment Station, Madison, parental clones and selected plants from polycross progenies of timothy (*Phleum pratense*) were inoculated with uredospores in talc in the greenhouse. Uredial infection type (standard scale [**24**, p. 272]) and percentage tissue infection gave similar results when inoculation was made during vegetative growth, but the former was much more useful than the latter in the elimination of susceptible plants when inoculation was at, or immediately after, heading.

No relationship was established between the rust reaction of the parent and that of progeny selections. It is concluded that a single reading, approximately 3 weeks after inoculation, may suffice in screening plants beyond the seedling stages.

Diachun (S.) & Henson (L.). **Protection tests with clones of Red Clover as an aid in identifying isolates of Bean yellow mosaic virus.**—*Phytopathology*, **48**, 12, pp. 697–698, 1958.

In further studies at the University of Kentucky, Lexington [**38**, p. 10], the red clover clone Ky C 71–8, which developed systemic necrotic spotting with bean yellow mosaic virus isolate 204–1, became mottled when inoculated with isolates 263, 266, and 427. On mechanical inoculation the mottled plants were protected against infection by 204–1, indicating relationships among these isolates. Similar results were obtained with clone Ky C 71.

Uspenskaya (Mme G. D.). Некоторые вопросы биологии возбудителя мучнистой росы Клевера. [Some questions on the biology of the causal agent of powdery mildew of Clover.]—*Proc. Lenin Acad. agric. Sci.*, **21**, 11, pp. 24–28, 1958.

It is reported from the Moscow State University that investigations in the Khimkhinski district, Moscow region, on powdery mildew (*Erysiphe communis* f. *trifolii*) [*E. polygoni*: **30**, p. 62] of *Trifolium hybridum*, *T. pratense*, and *T. medium* showed the period between conidia and cleistocarp formation to vary in the different spp. Conidia on cut clover leaves can be a source of infection only for 1–2 days after mowing, the fungus overwintering as cleistocarps. Infection is governed largely by the state of the soil; thus in well cultivated soil the fungus does not appear until Sept., in mild form or not at all, whereas in poorly cultivated soil the incidence was high and the disease appeared in the 2nd half of June. Control measures include sowing on well cultivated land, destroying crop remains, and mowing around clover fields, as wild clover is often a source of infection.

Moskovets (V. S.). Грибна флора ризосфери Люцерни на півдні УРСР. Повідомлення II. Кількісний та якісний склад грибної флори ризосфери Люцерни. [Fungal flora of the rhizosphere of Lucerne in south Ukrainian S.S.R. Information II. The quantitative and qualitative composition of the

fungal flora of the rhizosphere of Lucerne.]—*J. Microbiol., Kiev*, **19**, 3, pp. 44–50, 1957. [Russian summary. Received 1959.]

Following a 1st part on the description of the mycoflora of the lucerne rhizosphere and its peculiarities in different parts of the soil is a comparative study at the Ukrainian Academy of Science, Kiev, on the fungi washed from lucerne roots and in the soil near them. The highest number of fungi was found in the soil round the roots: *Penicillium*, *Fusarium*, *Aspergillus*, *Trichoderma*, and *Cladosporium* were predominant. In the 1st washing of the roots *Cladosporium*, *Torula*, *Dicoccum*, and *Alternaria* were most numerous. *Fusarium* was predominant only at the 5th washing. On the roots *Nectriella* sp., *Melanospora*, and *Sphaeronema* were reported as well as *Fusarium*. Thus the lucerne rhizosphere differs from those of cotton and spring and winter wheat.

Grković (S.). **Rja Jablan — nova bolezen na Dolenjskem.** [Apple rust—a new disease in Dolenjske.]—*Sadjar. vinar. vrtnar.*, **44**, 12, pp. 346–347, 1957. [Abs. in *Referat. Zh. Biol., 1958*, 18, p. 210, 1958.]

A description of apple rust (*Gymnosporangium tremelloides*), recorded for the 1st time in lower Slovenia, Yugoslavia [cf. **34**, p. 20]. Eradication of juniper [*Juniperus* sp.], the alternate host, in neighbouring fields is recommended.

Schneider (A.). **Modifications physiologiques chez le Pêcher parasité par Taphrina deformans.** [Physiological modifications in the Peach parasitized by *T. deformans*.]—*C. R. Acad. Sci., Paris*, **248**, 3, pp. 442–444, 1959.

At the Faculté des Sciences, Toulouse, an analysis of peach tissues infected by *T. deformans* revealed a water content of 80–83% compared with a max. of 70% in healthy tissue. The proportion of '-oses' (especially saccharose) is increased at the expense of '-osides', the former representing 75% of the soluble glucides in diseased foliage as against 30–40% in healthy. In young infected leaves citric acid tends to be more, and malic less abundant than in healthy material. The content of the former gradually lessens as the leaves age and decreases sharply with ascus formation, whereas the latter pursues an opposite course. In young foliage the quinic acid content of healthy and diseased tissues is equal but diminishes more rapidly in the latter and at the time of ascus formation is considerably lower. During senescence the proportion of aspartic acid decreases in relation to that of glutamic in healthy leaves but the positions are reversed in infected ones. The arginine content of young diseased foliage is lower than that of healthy but it increases steadily until the time of sporulation.

A correlation is postulated between these changes and the cytological modifications observed in infected tissues [**6**, p. 762]. Thus, the more vacuolar appearance of the parasitized cells is linked with the augmented water content, while the disappearance of the chloroplasts reduces assimilation. In the progress of the disease there are 2 main phases: at the outset the cells of the infected tissues continue to multiply as in young meristematic tissues, while all mitotic activity has ceased in the healthy ones; subsequently the mitoses are retarded and finally cease, many cell structures, notably the mitochondria, beginning to regress. The occurrence of these 2 phases is reflected in the development of the organic and free amino acids, which expresses the characteristics of prolonged juvenility at the outset and of premature senescence at the close. This interpretation is further elaborated. The 1st phase coincides with the growth of the mycelium within the host and the 2nd with sporulation.

Vuittenez (A.). **La maladie de Pfeffinger du Cérisier.** [Pfeffinger disease of Cherry.] —*Bull. tech. Ing. Serv. agric.* 103, 6 pp., 4 fig., 1955. [Received Jan., 1959.]

In the canton of Bâle, Switzerland, there are serious foci of Pfeffinger virus disease

[cherry rasp leaf virus: **36**, p. 705] within 10 km. of the French frontier; the author has also found the disease in 2 places in France, between Hesingue and Hegenhein, a few km. from the city of Bâle, and near Kembs-Schäferhaf, 15 km. from the Swiss frontier, and he briefly describes in semi-popular terms the geographical distribution of the disease, its symptoms, transmission, and control by the destruction of affected seedlings and use of healthy scions.

Blumer (S.). **Die Pfeffingerkrankheit am Zürichsee.** [Pfeffinger disease on Lake Zurich.]—*Schweiz. Z. Obst- u. Weinb.*, **67**, 19, pp. 490–493, 1958.

Cherry trees kept under observation at Meilen (Dollikon), Switzerland [**32**, p. 490], since 1947 exhibit what was at first thought to be a weakened form of Pfeffinger disease [cherry rasp leaf virus]. The primary symptoms ('oil spots', mosaic, and deformation of the leaves) are weakly expressed, and enations develop on the lower surface of leaves of normal size and form, whereas the usual secondary symptoms of Pfeffinger are smallness and narrowness of the leaves. Grafting to the susceptible Basler and Bing vars., however, produced typical symptoms.

It is emphasized that Pfeffinger disease is caused by a complex of at least 2 viruses, 1 of which, belonging to the ringspot group [cf. **37**, p. 490], is to some extent seed-borne; affected seedlings do not usually develop the typical secondary symptoms, but at Meilen they did when grown close to infected trees, infection presumably having come from the soil or by root contact. For this reason new plantings should not be made where infected trees have been. Work is needed to determine the viability of the soil-borne component in the soil.

Lovisolo (O.). **Sopra un deperimento del Ribes causato da 'Xanthochrous ribis'.** [On a wilt of *Ribes* caused by *X. ribis*.]—Reprinted from *Allionia*, **4**, 10 pp., 2 fig., 1958. [English summary.]

In 1951 and 1955 *Fomes ribis* was observed on red currants in several areas in Piedmont. Wilting symptoms sometimes did not become apparent until plants were 4 yr. old. In one area 30% of the bushes were affected. Attacks on individual bushes were not dangerous, affecting only 1 or 2 branches. There was stunting, yellowing of the leaves, and withering of many branches. Fruiting bodies were present at the collar and on the large tap root but no infection was seen on the aerial parts. Infected bushes or parts should be destroyed. Pruning should be so done as to favour rapid cicatrization, and wounds (which should be disinfected) not made near the base of the plants.

Dement'eva (Mme M. I.). Биохимические и физиологические факторы устойчивости Крыжовника к мучнистой росе. [Biochemical and physiological factors in the resistance of Gooseberries to powdery mildew.]—*Trans. Moscow Ord. Lenin Acad. Agric., 1958*, 5 (24), pp. 149–160, 1 graph, 1958. [English summary.]

At the Timiryazev Agricultural Academy, Moscow, gooseberry vars. resistant to *Sphaerotheca mors-uvae* [**34**, p. 97] were found to have a lower catalase and higher peroxidase activity than susceptible vars. Fruits of the resistant Chernŷi Negus and Howton had a higher organic acid content and less sugar than susceptible vars., while pH in the leaves and fruit was lower. The resistant vars. had a thicker cuticle on the leaves, fruit, and shoots, transpiration was less intensive, and the stomatal pores were smaller.

Maklakova (Mme G. F.). Фитофтора на Землянике. [*Phytophthora* on Strawberries.]—*Zashch. Rast., Moscow* [*Plant Prot., Moscow*], *1958*, 6, p. 54, 1958.

A blight on strawberries in the Pushkin district was found to be caused by *P. fragariae*, a 1st record for the U.S.S.R. [map 62]. The roots were severely attacked

and it is believed that the disease may be spreading in neighbouring districts. Spraying with 1% Bordeaux at the beginning of the bud stage is recommended.

VALENZUELA (J. L.). **Mancha en la hoja o viruela de las freseras causada por Mycosphaerella fragariae (Schw.) Lindau.** [Leaf spot or small pox of Strawberry caused by *M. fragariae*.]—*Suelo Tico*, **10**, 40, pp. 113–118, 5 fig., 1958.

A description of the disease [map 110], widespread in Costa Rica, is followed by suggestions for control by selection of well-drained sites not directly exposed to the sun; changing the site at least every 5 yr.; removal of dead and spotted leaves before transplanting and dipping the transplants (not the roots) in 4:4:50 Bordeaux; use of resistant vars.; spraying with Bordeaux from the appearance of the 1st new leaves until the 1st fruits are half ripe; and removal and burning of diseased and dead leaves.

MINZ (G.). **Safflower rusts in Israel.**—*Ktavim*, **8**, 3–4, pp. 209–212, 2 fig., 1958.

Puccinia carthami and *P. verruca* [**23**, p. 40] have been identified in Israel at the Agricultural Research Station, Rehovot. The former appears on the leaves late in the growing season and is occasionally found on the hypocotyl also, while the latter may even appear on the 1st leaves of the seedling. The 2 fungi produce conspicuously and consistently different symptoms on their host.

MOHANTY (N. N.) & BEHERA (B. C.). **Blight of Sesame (Sesamum orientale L.) caused by Alternaria sesami (Kawamura) n.comb.**—*Curr. Sci.*, **27**, 12, pp. 492–493, 2 fig., 1958.

A survey by the State Agricultural Research Station, Bhubaneswar, revealed that sesame blight is widespread in India and under moist conditions causes considerable damage. The pathogen closely resembles *Macrosporium sesami*, with the difference that the conidia occur in chains. The fungus has accordingly been reclassified as *A. sesami*.

KLJAJIĆ (R.). **Septoria digitalis Pass. parazit lekovitih Digitalis spp. u Yugoslaviji.** [*S. digitalis* a pathogen of the medicinal *Digitalis* spp. in Yugoslavia.]—*Posebna Izd. Inst. Zasht. Bilja, Beograd* [*Spec. Edit. Inst. Plant Prot., Beograd*], *1958*, 9, 52 pp., 20 fig., 1 graph, 1958. [English summary (3 pp.). 41 ref.]

Investigations by the Phytopathological Section, Zemun, Beograd State University, in 1954–57 on *S. digitalis* [**35**, p. 487], the epiphytotic nature of which had not been recognized, showed it to be present in many areas on all wild or cultivated *Digitalis* spp. The disease causes a general spotting on *D. lanata* but in *D. purpurea* is confined to the leaves and stem. The spots become necrotic with numerous pycnidia in stroma on the surface. Only 2 of the 23 strains isolated were investigated. The opt. temp. for the pathogen is 22–24° C., min. 3°, and max. 35°. Spores cannot germinate after 5 days at 37°, but at —15° and —10° vitality lasts for 3 and 6 months, respectively. The incubation period in the greenhouse is 7–8 days, but at 20–24° it may be only 6 days. In the field the incubation periods for young plants were: at 10·1°, 13 days; at 14°, 11; at 18·3°, 8; and at 21·8°, 6; it is a day or two longer for older plants. The virulence of the fungus is greatest on the cotyledons and young leaves of *D. purpurea* and *D. lanata*, persisting in older plants of the latter. Other genera of Scrophulariaceae could not be experimentally infected.

The fungus overwinters as pycnidia and stroma, rarely as mycelium in necrotic tissue. It is also seed-borne by pycnidiospores on the seed surface, which remain viable for more than 6 months. All the 15 spp. tested were susceptible, *D. lanata* the most (disease index up to 92) and *D. ambigua* the least (14–21). Bordeaux at

0·5, 1, and 2%, captan, and zineb were effective against the pycnidiospores and controlled the disease when leaves and seeds were inoculated. Seed disinfection with orthocide-75 and thiram was successful.

MINZ (G.). **Two Diplodia species in Date Palm.**—*Ktavim*, **8**, 3–4, pp. 213–216, 1 fig., 1958.

In further studies [**33**, p. 348] at the Agricultural Research Station, Rehovot, Israel, *Diplodia phoenicum* and *D. natalensis* [loc. cit.] were isolated from diseased leaf-stalks and bases of offshoots of date palms. Cultural, biometric, and pathogenic studies revealed differences between the 2 spp.

D. natalensis, very widespread in the country on a variety of hosts, and *D. phoenicum*, common on date palms but not pathogenic to citrus, are both a potential danger to date palm plantations in Israel.

LEATHER (R. I.). **Further investigations into the 'Cape St. Paul wilt' of Coconuts at Keta, Ghana.**—*Emp. J. exp. Agric.*, **27**, 105, pp. 67–78, 1 graph, 1 map, 1959.

It is noted from the Dept Agric., Ghana, that the symptom development of this disease [**35**, p. 448; **38**, p. 23] is never reversible as occasionally happens with bronze leaf wilt of coconuts in the Carribean. Gum pockets were sometimes found in the leaf bases and at the calyx end of unripe nuts, and also occasionally a brown rot at the base of the bole of young affected palms. Binucleate cells were never observed in the leaf epidermis of diseased palms [**35**, p. 366]. Iodine testing showed more starch accumulation in the mid-ribs of green leaves from diseased than from healthy palms. No starch reaction was given by palms affected by severe water-logging. The rate of leaf growth after the onset of symptoms varied considerably in different palms [cf. **25**, p. 447].

The early outbreaks of the disease were scattered through areas in which all the palms have now died. Spread in plots under observation has been random, sometimes beginning with a group of palms, sometimes with isolated individuals. In some areas the disease persists in a chronic rather than acute form, and it is notably less prevalent nearer the seashore. Other, distinct, conditions in the areas under discussion are associated with prolonged droughts (mean ann. rainfall 32 in.) or flooding in abnormal wet seasons. The relationship of Cape St. Paul wilt to local variations in soil type and to the irregular occurrence of a calcareous hard pan formed at about mid-season ground-water level (4–6 ft.) is described in detail, but no constant correlation with disease intensity was evident. Palms withstood changes of total chloride amounting to 8,000 p.p.m. through the year, and sometimes yielded well where the max. reached 20,000 p.p.m.

In an extensive series of experiments with fertilizers and trace elements applied in various ways uptake of elements was proved by foliar analysis, but no correlation of nutrition with the onset of the disease was evident. Isolations of soil fungi yielded very similar results to those obtained in India [**34**, p. 594]. Isolates from diseased palms included no active parasites; *Fusarium* spp. appeared to be less prevalent than in French Togoland [**30**, p. 414]. Attempts at transmission by numerous means, including the use of soil from diseased areas and inoculation with various forms of diseased tissue, gave negative results. The possible resistance of palms raised from nuts obtained from surviving plants and also from dwarf vars. is being investigated [**35**, p. 366].

Possible causes of the disease are discussed. Although such symptoms can be induced by certain soil-water conditions, no definite cause of this nature can be found to account for the epiphytotic in many parts of the area concerned. It is suggested that the ground water may be rendered toxic by the accumulation of the products of root decomposition, and such a possibility is to be further investigated.

Sixth Annual Report of the West African Institute for Oil Palm Research, 1957–1958.—143 pp., 2 col. plans, 1958. 2*s*. 6*d*.

In the section of this report [cf. **37**, p. 366] dealing with plant nutrition (pp. 103–107) R. A. Bull records that the laboratory of the Plant Nutrition Unit is now in full operation. Sand culture experiments indicated that the range of macronutrient deficiency symptoms shown by seedling and mature oil palms may be small; deficiencies of N, K, Ca, Mg, or S are all characterized by leaf chloroses which in their early stages may be almost identical. Hence it has been decided to determine the deficiency symptoms of crops which are of great potential value as indicator plants when grown in association with oil palms. The results obtained in the Mg fertilizer trial suggest that to suppress visual symptoms of Mg deficiency it may prove necessary to apply Mg every 18 months–2 yr.

In the section on plant pathology (pp. 107–117) J. S. Robertson states that good control of freckle (*Cercospora* [*elaeidis*]) with very little burning was given by perenox (1 lb./100 gal. water). The cost of pruning and spraying seedlings in the field was approximately 10*s*./acre. Clear evidence was obtained that spray deposits of perenox, ziram, and thiram are unstable when applied without a sticker [cf. **36**, p. 469].

In the Main Station nursery only 3·5% of all seedlings developed blast [cf. **38**, p. 157]. There appears to be a highly significant negative correlation between incidence and total rainfall for Aug–Sept., immediately before the blast season. Both a *Pythium* sp. [**37**, p. 366] and *Rhizoctonia lamellifera* were constantly isolated from diseased seedlings. The former can be most easily isolated from the primary infections of the fleshy root tip, while *R. lamellifera* is usually associated with cortical rot in older root tissue. In artificial culture the *Pythium* may be parasitized by *R. lamellifera* [cf. **36**, p. 774].

R. lamellifera was unable to penetrate healthy, undamaged roots in tests, and it is now thought that it becomes established by parasitizing the *P.* sp., which is the primary pathogen. Seedlings inoculated with a mixed inoculum of both developed symptoms of disease more rapidly than others with *Pythium* only. After 14 days 50% of the seedlings inoculated with *Pythium* only and 10% of those inoculated with the mixed inoculum showed signs of recovery.

The effects of soil moisture on the growth of the two fungi were studied by a modification of Rushdi and Jeffers' method [cf. **35**, p. 633]. Dried soil was passed through a 50-mesh screen and divided into 8 samples, which were wetted to give moisture contents ranging from air-dry to 20%. Sections of glass tube 20×1 cm. were plugged at one end and filled half way with soil, the rest of each sample being placed in a 100 ml. flask and both flask and tube sterilized. After 24 hr. the tubes were inoculated with agar disks from cultures, filled up with soil from the flasks, and incubated for 4 days at 30° C. A low-power binocular microscope was used to determine the distance which the mycelium had advanced. The results indicated that *R. lamelliferae* is able to grow over a wide range of soil moisture contents (opt. about 10%). *Pythium*, on the other hand, has a definite opt. slightly below 10%.

It was found that at the onset of the blast season soil moisture decreases; blast first appeared in unmulched plots on 24 Oct., when the soil moisture was approx. 10%, but did not develop in mulched plots until 14 days later, when their moisture content was approx. 11%, but blast losses were so low that no significant effects of this treatment on incidence were apparent. From Sept. to Jan. soil temp. rose from 26 to 30°. Both fungi have an opt. growth temp. of about 29°. There was some indication that soil sterilization with santobrite and formalin reduced infection.

Evidence indicated that the *Pythium* sp., when grown in Czapek's solution, produces a toxic substance which can be separated by centrifuging. When added to water in which detached leaves of oil palm seedlings were placed, typical

symptoms of blast developed within 5 days. Leaves kept in water or in Czapek's solution remained healthy. Analysis of observations on the incidence of diseased and healthy plants in nurseries afforded slight evidence that incidence was higher where diseased neighbours were already present.

Twenty seedlings were affected by a condition suspected to be due to a ring spot virus. Folded leaflets showed by transmitted light a faint, white chlorosis as interveinal spots or streaks; lateral coalescence of severe lesions may lead to the formation of large, bleached areas occupying up to half the width of the leaflet. After the pinnae have become fully expanded, pale green, annular lesions appear, most noticeable on the upper surface. The lesion boundary is rather sharp, with no pronounced halo. There may be some shortening of the apical pinnae. In seriously affected leaves there are chlorotic spots and streaks of considerable variation; complete transition of lesion types from spots to large, compound, lobed or streaked chlorotic areas involving almost the entire leaf surface can be found.

Proceedings of the third conference on Potato virus diseases, Lisse-Wageningen, 24–28 June 1957.—282 pp., 54 fig., 30 graphs, Wageningen, H. Veenman & Zonen, 1958.

At this International Conference [cf. **35**, p. 479] 36 papers were presented. R. Bartels, Institut für Virusserologie, Brunswick, reported [German, with English summary] (pp. 13–19) serological relationships between a normal strain of potato virus Y [**38**, p. 271] and other named strains inducing necrotic symptoms [cf. **37**, p. 500]: in cross-reaction tests every strain reacted with every antiserum but there were differences between the titres of homologous and heterologous antigens, assumed to be due to the presence of specific antibodies. In cross-absorption tests the normal strain and the necrotic strains proved to be neither identical nor closely related. A. Rosendaal, Wageningen, & D. H. M. Van Slogteren, Lisse, reported in detail (pp. 20–36) finding in the Netherlands in 1954 a Bintje plant infected with a virus which proved to be serologically identical with, or at least closely related to potato virus M [cf. **36**, p. 780]. J. A. van der Veken, Lisse, reported (pp. 37–40) that intravenous injection of potato virus X into horses gives rise to an antibody, apparently of the multivalent type produced by rabbits following injection of γ-globulin. Subcutaneous injection stimulated the production of another type of antibody, resembling an antitoxin, precipitating only at high antigen concentration. In conductimetric studies at the Botanical Institute, Cracow, of protein-free sap of potato tubers, Aniela Kozłowska (pp. 41–52) [German, with English summary] found that lowland-grown potatoes from Pomerania or near Cracow stored malic acid and asparagine and were predisposed to virus infection: when symptoms became visible aspartic acid [**38**, p. 249] made its appearance in the conductograms and O uptake increased and was nearly twice that of mountain-grown tubers from Zakopane [cf. **37**, p. 368]; in these the lack of malic acid and asparagine and the presence of glutamic acid and glutamine, coupled with absence of predisposition for the synthesis of virus protein, may have been the reason. C. Martin, Station Centrale de Pathologie Végétale, Versailles, described [French, with English summary] (pp. 53–58) the use of his colorimetric test [**35**, p. 784] for potato viruses. Pigmentation in shoots infected with viruses X, Y, or A [**37**, p. 550] may result from the development, during virus synthesis, of a metabolite, possibly a purine or pyrimidine base (cf. Thimann & Radner—*Arch. Biochem. Biophys.*, **59**, pp. 511–525, 1955), which interferes with the synthesis of anthocyanins.

J. R. Sardiña, A. G. Orad, & F. P. San Roman, Spain (pp. 59–70), found that lacmoid staining of the callose plugs of the sieve plates (10 min. in 1% aqueous lacmoid, rinsed, differentiated for 1 min. in 0·5% acetic acid, and mounted in glycerine) permitted diagnosis of potato leaf roll virus infection [cf. **35**, p. 540;

38, p. 272] in 90% of tubers when it was already known whether they were infected, but errors were more numerous when the test was applied as a standard diagnostic technique: it was less reliable with primary infections and immature tubers. Moderate abundance of callose plugs in every vascular bundle is a more reliable indication than more abundant callose restricted to a few bundles. At the Bayerische Landesanstalt für Pflanzenbau, Munich, F. Sprau (pp. 71–79) [German, with English summary] used a sieve tube callose staining technique (with reso blue [loc. cit.], occasionally checked by use of the more sensitive fluorescent stain from water blue [**37**, p. 369]), to follow the distribution of potato leaf roll virus in eye cuttings of the var. Agnes, inoculated by exposure to viruliferous aphids at 4 and 8 weeks, and sampled at intervals. Those inoculated at 4 weeks showed the first characteristic callose formations in various aerial parts as early as 16 days after inoculation, and in all aerial parts after an av. of 32 days: external symptoms appeared some days later. In those inoculated at 8 weeks the first characteristic plugs occurred after 22 days: external symptoms were seen in a few plants only.

At Rothamsted Experimental Station M. Chessin (pp. 80–84) prevented for some time the development of stunt in the lower leaves of White Burley tobacco and *Nicotiana glutinosa* inoculated with tobacco etch virus by spraying them at intervals with gibberellic acid [**37**, p. 631], the 1st application being immediately after inoculation. It is suggested that the effect might have been prolonged by spraying the entire plants. Severely stunted tobacco plants retained their ability to respond 126 days after inoculation. Following studies on both seed and ware crops since 1950, M. Hollings (pp. 85–90) reported from the Plant Pathology Laboratory, Harpenden, that the spread of potato leaf roll virus and potato virus Y is closely correlated with the numbers of alate *Myzus persicae* [**38**, p. 24] caught on sticky traps [cf. **29**, p. 379], and with the angle of colonization of the crops (based on the line from an arbitrary zero point to the peak of the infestation curve) by the aphid. L. Broadbent, P. E. Burt, & G. D. Heathcote (pp. 91–105) reported trials at Rothamsted. In 1955 6 or 8 applications of DDT reduced the spread of leaf roll to a negligible level [loc. cit.; **36**, p. 53], and the incidence of rugose mosaic [**38**, p. 158] was less than half that in control plots: in 1956 4 or 6 applications (at high or low vol.) permitted little spread of leaf roll virus, and the incidence of virus Y was only doubled. Both methods of application were equally effective. It is concluded that in so far as leaf roll is concerned the maintenance of healthy stock does not depend on the health of nearby crops, as spread within the crop can be prevented and infected plants removed [cf. **38**, p. 24]. However, insecticidal spraying prevents neither the introduction nor the spread of virus Y. C. Martini (pp. 106–113), of the Institut für Pflanzenkrankheiten, Bonn, reported studies of the transmission of turnip yellow mosaic virus, a serologically related variant thereof (cf. Broadbent [**36**, p. 506]), turnip crinkle virus, and turnip rosette virus [**38**, p. 234] by flea beetles, *Phyllotreta nemorum* and *Psylliodes chrysocephala* being the most suitable, though 8 other *Phyllotreta* spp. and *Psylliodes cuprea* could also act as vectors. The beetles were capable of transmission within a few minutes of feeding but did not then remain infective for more than 1 day, and even with infection feeds of 5–20 days they did not remain infective for more than 5 days. The few results obtained with turnip rosette virus indicate that it also is transmitted by biting insects. H. A. Van Hoof (pp. 114–116), of Wageningen, briefly reviewed the question of aphid transmission of non-persistent viruses [cf. **38**, p. 72]. Summarizing the results of trials at Wageningen since 1954, in which haulm destruction in 'seed' crops by chemical spraying was sometimes preceded by pulverizing [cf. **36**, p. 721], M. M. de Lint (pp. 117–121) concluded that such spraying was more effective on medium than on late vars. Killing the remaining stems after pulverizing was easier under the cloudy and rainy conditions of 1954 and 1956 than in the dry weather of 1955. Provided the development of new shoots

on the remaining stems is prevented, infection of the progeny by leaf roll virus should be no greater with pulverizing and destructive spraying than when the haulms are pulled.

G. Sommereyns (pp. 122–131) reported [French, with English summary] chromatographic studies of potato virus Y [cf. **36**, p. 723] at the Laboratoire de Phytovirologie, Gembloux, Belgium, using paper and starch and several organic and inorganic solvents. In some instances the virus was obtained in a narrow band of R_F value 0·6. The virus remained infective after separation by this means, which may prove suitable as a method of purification. J. M. Todd (pp. 132–143) of the Dept of Agric. for Scotland, Edinburgh, reported surveys indicating that the spread of potato virus X into virus-free stocks is normally slow and generally not apparent until the 2nd growing season following the release of a stock, after which the number of infected plants approx. doubled every season. Any extensive and rapid infection resulted either from the mixing of stocks, or the adjacency of abnormal amounts of infective material; the tubers are relatively resistant to mechanical infection. The virus was readily transmitted on the human person and clothing and on the hair of dogs and rabbits. [A shorter version of this paper appears in *Scot. Agric.*, **38**, pp. 65–67, 1958.]

G. Cockerham (pp. 144–148), at the Scottish Plant Breeding Station, Roslin, studied the rate of spread of potato virus X in crops of Majestic derived from a single source with 1% infection and found that when the crops were raised in virtual isolation the virus content approx. doubled annually, whereas in less isolated crops the rates of increase were much greater. A paper by G. Gigante (pp. 149–152) [French with English summary] on virus diseases of the potato in Italy has already been noticed [**37**, p. 733].

At Rothamsted B. Kassanis & T. W. Tinsley (pp. 153–155) freed normal tobacco tissue cultures from potato virus Y by maintaining them for 3 weeks or more on media containing 100 mg./l. thiouracil. Progenies from cultures treated in this way remained free from detectable virus for 1 yr. after treatment. Spraying systemically infected plants decreased the virus content of the leaves, but did not eradicate the virus. A. D. Thomson (pp. 156–159) reported the eradication of leaf roll and witches' broom viruses from potato tubers at the A.R.C. Virus Research Unit, Cambridge. By use of excised meristems from shoot apices and stem segments from sprouted tubers kept at 30–38° C. in darkness for 7–110 days and then grown on artificial culture media, viruses Y, A, and S [potato paracrinkle virus (str.)], but not X [cf. **37**, p. 108], were eliminated from the var. Aucklander Short Top.

B. D. Harrison (pp. 160–167) reviewed his work on beet ringspot virus (related to tomato black ring virus [**37**, p. 697]) at the Scottish Horticultural Research Institute, Invergowrie. C. H. Cadman (pp. 168–172) isolated from diseased plants in a crop of Kerr's Pink a virus described as potato ring necrosis virus, from the large necrotic rings produced in tobacco; in potato local necrotic lesions develop in the inoculated leaves, and systemic symptoms are stem necrosis and a mottling and necrotic etch patterning of the leaves. It is occasionally transmitted through the tubers. In most test plants the symptoms are indistinguishable from those of tobacco rattle [potato stem mottle: cf. **28**, p. 85] virus, but ring necrosis does not cause systemic infection in *Nicotiana glutinosa* and its thermal inactivation point is slightly higher (10 min., 80–85° C.). Aniela Kozłowska (pp. 173–178) reported from the Botanical Institute, Cracow, Poland, observations of a rhythm in the development of virus X infection in potatoes imported from Pomerania and subsequently grown at Cracow [cf. **37**, p. 368]. A decrease in the amount of virus X present was accompanied by an increase in virus S.

J. B. Loughnane (pp. 179–183) reported from University College, Dublin, that grafts from a King Edward plant containing potato paracrinkle virus produced

tuber necrosis in Arran Victory, Majestic, and 15 other vars. out of 29 tested: this symptom was generally associated with paracrinkle foliage symptoms. Virus S was ruled out as a possible cause of the tuber necrosis, as many of the vars. studied, including Arran Victory, carry this virus without any such effect. Investigations are in progress to determine whether the virus in question is identical with virus M [**36**, p. 266]. At the Statens Växtskyddsanstalt, Stockholm, D. Lihnell (pp. 184–188), in the course of annual field trials on more than 100 potato vars., found that the percentage of symptom-bearing tubers in the offspring of tubers with spraing symptoms is usually low. Secondary symptoms (i.e. those in the 2nd or following tuber generations) are similar to primary, but their position in the tuber indicates entry of the virus via the stem. Sometimes stem mottle-like symptoms ('spraing mosaic') occur on plants grown from symptom-bearing tubers (cf. the necrotic haulm symptoms described for such plants by Van der Want [**32**, p. 145]): this mosaic is transmissible by grafting to potato, tomato, and tobacco, but not by sap inoculation. It is concluded that spraing is probably caused by a virus related to, but not identical with, potato stem mottle virus.

At the Biologische Bundesanstalt, Brunswick, Germany, E. Köhler (pp. 189–198 [German]) found no multiplication of virus X [**38**, p. 134] in inoculated leaves of U.S.D.A. seedling 41956, in which inactivation was much more rapid than in Samsun tobacco, *Datura stramonium*, *Gomphrena globosa*, and potato var. A6, or in *Phaseolus vulgaris*. It may be that immunity in 41956 is of the type described by Hutton & Wark [**32**, p. 499], and that premature decay of the virus particles occurs within the plasmodesmata of the outer walls of the epidermal cells. Presenting genetical data from breeding experiments on *Solanum acaule* and *S. demissum*, performed at the Scottish Plant Breeding Station, Roslin, G. Cockerham (pp. 199–203) concluded that in *S. acaule* reaction to potato virus X is determined by 3 allelomorphic genes which, in descending order of dominance, determine immune, necrotic, and tolerant responses. In *S. demissum* genes controlling necrotic reaction to Y and A, necrotic reaction to A but not Y, and anecrotic tolerant reactions to both were also found to be alleles: there is evidence that viruses Y and A are related. H. Ross (pp. 204–211) reported from the Max Planck Institute for Plant Breeding, Cologne-Vogelsang, Germany, that resistance to virus Y in *S. stoloniferum* [**38**, p. 71] is governed by one gene, inherited in a disomic manner. A. J. R. Beemster (pp. 212–217), of Wageningen, reported mature plant resistance to virus X [cf. **32**, p. 143; **38**, p. 24] in Bintje, Eigenheimer, and Voran, and to leaf roll virus in the first 2. This may prove important in the cultivation of seed potatoes.

H. P. Hansen (pp. 218–232) outlined a classification of plant- and vertebrate-infecting viruses [cf. **37**, p. 28] based on their biochemical potentialities in the host. Following studies at the Laboratory of Phytopathology, Bogor, Indonesia, and at Wageningen, T. H. Thung & T. Hadiwidjaja (pp. 233–238) concluded that the soil-borne tobacco Rotterdam B virus [tobacco mosaic virus (str.)] resembles tobacco rattle virus [potato stem mottle virus (str.)] in that it produces in wrapper tobacco (at least in the tropics) rattle-like symptoms and is absorbed by clay minerals, while relationship to tobacco mosaic virus is indicated by cross protection tests: it does not, however, react with antiserum for that virus. N. S. Wright (pp. 239–245), Plant Pathology Laboratory, Vancouver, described the identification of 3 strains of potato witches' broom virus, indistinguishable in seedling 41956 [cf. **32**, p. 334], by grafting to Bonnie Best tomato and *Cyphomandra betacea*. In the latter composite symptoms did not develop in response to graft-inoculation with strain complexes: when strain 2 was present it alone found expression.

V. Valenta reviewed work on potato witches' broom virus in Czechoslovakia [**38**, p. 135] carried out since 1955 at the Institute for Virology, Bratislava, with isolates from a number of localities. Of 19 solanaceous spp., representing 8 genera, 16 were susceptible to graft inoculation. The symptoms in all excepting *Nicotiana*

glauca (apparently a symptomless carrier) were characterized by virescence, phyllody, and floral proliferation. Besides potato there is as yet no known natural host of the virus in Czechoslovakia. In a study at Wageningen of the disease of crimson clover described by Maramorosch [**33**, p. 298] H. H. Evenhuis (pp. 251–254), using leafhoppers of one sp. (*Euscelis plebejus*) from the same orchard, found that the first symptoms, sometimes occurring as early as 1 week after feeding, and consisting principally of deep ridges on the upper surface of the leaflets, were attributable to a toxin excreted by the insect. The later symptoms, including a chlorosis spreading from the margins, appeared after a min. of 3 weeks: these were thought to be probably due to strawberry green petal virus [cf. **37**, p. 243]. From symptoms in aster the virus does not appear to be identical with European or American strains of aster yellows virus [cf. **35**, p. 689]. C. Blattný (pp. 255–263 [German with English summary]), Czechoslovakian Academy of Sciences, Prague, discussed the difficulties encountered in studying the relationships of viruses of the tomato stolbur group [cf. **38**, pp. 74, 159]. M. Klinkowski (pp. 264–277), Phytopathologisches Institut, Martin Luther University, Halle-Wittenberg, Germany, reviewed [German, with English summary] the present position of research on tomato stolbur virus [cf. **37**, pp. 28, 764], its symptoms, relationships, host range, and persistence. V. Valenta (pp. 278–282) stated that in Czechoslovakia, as in other middle- and S.-E. European countries, the leafhopper (*Hyalesthes obsoletus*) vector of stolbur virus [**38**, p. 135] is not present over the whole area of distribution of the virus; other spp., including *Aphrodes bicinctus* and *Macrosteles laevis*, vectors of the possibly related European strain of aster yellows virus (*NachrBl. dtsch. PflSchDienst* (*Braunschweig*), *Stuttgart*, **7**, pp. 161–164, 1955), are under study. So far 25 plant spp., belonging to 6 families, have been experimentally infected [loc. cit.].

Augier de Montgremier (H[élène]). **Obtention de sérums polyvalents pour la détection des virus de la Pomme de terre.** [Obtaining polyvalent sera for the detection of Potato viruses.]—*Ann. Épiphyt.*, **9**, 3, pp. 245–255, 2 graphs, 1958.

In studies (with the technical collaboration of Mme E. Montespan) at the Station Centrale de Pathologie Végétale, Versailles, the author prepared polyvalent sera for the detection of potato viruses X, Y, and M [**37**, p. 552] by mixing antisera prepared against single viruses. Strong sera poor in normal anti-protein antibodies were selected from the antisera available and 3 mixtures were prepared: 1 vol. serum anti-X+1 vol. anti-Y; 1 vol. anti-X+3 vol. anti-Y; and 1 vol. anti-X+3 vol. anti-Y+1 vol. anti-M. These mixed sera must be diluted ($> \frac{1}{10}$) to eliminate interference by normal proteins.

The effect of the dilution of the antisera by one another was compensated for by a reinforcement phenomenon. It was found that mixture (3) should be diluted to $\frac{1}{15}$. Antisera previously brought to the dilution ordinarily used can be mixed together in equal parts. A study of mutual reinforcement by antisera showed that the complement plays no part in this. A comparison of the action, as a diluant, of physiological saline, normal serum (fresh or old), and an antiserum (anti-Y or anti-MT) on an undiluted, non-complemented anti-X serum diluted to $\frac{1}{15}$ indicated that sera anti-Y and anti-MT reinforce the precipitation-reaction of virus X by its antiserum by bringing into action a property not attributable to a normal serum. Comparison of similar dilutions of normal serum and sera anti-Y and anti-MT showed that there was always a difference in favour of serum Y or MT, except when the concs. were too low.

Schmelzer (K.). **Infektionen mit dem Kartoffel-A-Virus an Nicotiana glutinosa L.** [Infections with Potato virus A on *N. glutinosa*.]—*Naturwissenschaften*, **46**, 2, pp. 83–84, 1 fig., 1959.

N. glutinosa, hitherto believed to be immune from infection by potato virus A, has

been successfully and repeatedly inoculated with Köhler's potato strains P 716/12, Sabina g, and Magna 556 [**33**, p. 580] since Dec. 1956 at the Institut für Phytopathologie, Aschersleben, Germany. The use of infected sap from *N. glutinosa* reduced the incubation period from some weeks to about 10 days. Variable symptoms developed, including dark green veinbanding accompanied by crinkling after initial clearing of the secondary leaves, which were later killed by necroses; dying-off of the stems; and stunting of the plants, which produced only a few wilted leaves at the shoot tips. Other plants reacted merely by the formation of chlorotic and necrotic areas and crinkling of the foliage. Strain P 716/12 differed markedly from the other 2 in inducing necroses along the veins and necrotic spots on the leaves, closely resembling those induced by tobacco mosaic virus. Plants inoculated with this strain died more rapidly and frequently than those tested with Sabina g and Magna 556.

The responsibility of potato virus A for the foregoing symptoms is adduced by: both the virus and sap from inoculated *N. glutinosa* induced in Samsun tobacco plants characteristic non-necrotic mosaic symptoms in the form of a faint pearl pattern, while leaves of the hybrid A 6 (*Solanum demissum* × Aquila) reacted by the development of typical blackish, necrotic local lesions [loc. cit.]; the virus could not be isolated from symptomless *N. glutinosa* plants.

Bojňanský (V.). **Příspěvek k symptomatike stolburu u Zemiakov.** [On the question of the symptomatics of stolbur in Potatoes.]—*Čsl. Biol.*, **6**, 6, pp. 449–456, 1957. [Russian & German summaries. Abs. in *Referat. Zh. Biol., 1958*, 18, p. 208, 1958.]

Observations on 210,000 potato tubers of different vars. in Czechoslovakia made evident new symptoms on the haulm (characteristic freshness of the stems after withering of the leaves) and tubers (semi-spindle like shoots, arrested growth of new tubers, and formation of many new tubers before the older ones reach a normal size) caused by stolbur virus infection [**38**, p. 332]. These symptoms are considered to be of use in selecting 'seed' for spring and summer sowing, especially in warm regions, avoided hitherto for potato trials.

Plekhanova (Mme A. I.). Фитофтора на Картофеле в Таджикистане. [*Phytophthora* on Potatoes in Tadzhik.]—*Zashch. Rast., Moscow* [*Plant Prot., Moscow*], *1958*, 6, p. 56, 1958.

In the Stalinabad and Shakhrinausk regions, Tadzhik S.S.R., after a very wet spring and summer, late blight (*P.* [*infestans*: **38**, pp. 28, 96]) was noticed for the 1st time in the republic on the var. Epron and to some extent on Lorh. The pathogen may have been imported in 1957 with Epron seed potatoes; it has not yet been recorded on local vars.

Radziyevs'kiĭ (G. G.). До біології **Synchytrium endobioticum (Schilb.) Perc.** [On the biology of *S. endobioticum*.]—*J. Bot. Acad. Sci., Ukr.*, **15**, 4, pp. 88–93, 2 fig., 1958. [Russian and English summaries.]

The results of experiments at the Botanical Institute, Kiev, showed that the maintenance of an opt. soil moisture (80–90%) by watering wart-infested potato plots during the growing period, with subsequent pulverization of the soil, may clear the soil of viable resting sporangia.

Malcolmson (Jean F.). **Some factors affecting the occurrence and development in Potatoes of gangrene caused by Phoma solanicola Prill. & Delacr.**—*Ann. appl. Biol.*, **46**, 4, pp. 639–650, 1 graph, 1958. [14 ref.]

In studies at the Universities of Edinburgh and Cambridge, the North of Scotland College of Agriculture, Aberdeen, and Sutton Bonington, it was shown that potato

gangrene is caused by *P. solanicola* (formerly *P. tuberosa*) and *P. foveata* [**36**, p. 421; **37**, p. 210; **38**, p. 274] now referred to *P. solanicola* f. *foveata* [? f. sp. nov.]. The disease was demonstrated to be soil- and haulm-borne, infection of the tubers taking place through wounds (cuts, bruises), eyes, and lenticels, when wound healing is retarded. Dark, dry storage at low temp. was conducive to the disease, max. rotting occurring at 5° C., the lowest temp. tested, and being increased when tubers had previously been at a higher temp. (16°) before inoculation. Storage at 21° for 10 days arrested the rotting. There were varietal differences in susceptibility which increased with advancing maturity of the tubers; some early and some late vars. were equally susceptible.

P.s. f. *foveata* forms a brown diffusible pigment in the culture medium.

Kharkova (Mme A. P.) & Rudenko (N. M.). Новые данные о заболевании клубней Картофеля в Мурманской области. [New data on a disease of Potato tubers in the Murmansk region.]—Бюл. всес. Ин-та Растениев. [*Bull. vsesoyuz. Inst. Rasteniev.*], *1957*, 3, pp. 36–38, 1957. [Abs. in *Referat. Zh. Biol.*, *1958*, 16, p. 210, 1958.]

In the Murmansk region, U.S.S.R., pustular scab (*Oospora pustulans*) caused excessive damage in potatoes [**37**, p. 736]. There are 4 types of infection: superficial flat pustules, convex pustules, depressed and irregular patches, and heavily depressed, circular pit-like spots. In the absence of spots the eyes are badly damaged. Usually the symptoms appear only during storage (Dec.–Jan.). The main source of infection is diseased seeds.

Williams (A. S.) & Nielsen (L. W.). **Effect of temperature and inoculum source on the movement of the internal cork virus and on symptom development in core-grafted Sweetpotato roots.**—*Phytopathology*, **48**, 12, pp. 646–648, 1 fig., 1958.

In further studies at N. Carolina State College, Raleigh [cf. **32**, p. 505], healthy Porto Rico sweet potato roots were inoculated with 1 in. core grafts from roots infected by the virus, and after incubation for various periods cores from these roots, taken 1, 2, or 3 in. from the initial graft, were inserted into healthy roots. The virus moved 1 in. from the graft in 60 days at 60° F., 14 days at 70°, and 6 days at 80°. About 50% of the inoculations resulted in symptoms (small necrotic lesions adjacent to the graft) in 46 days when the inoculum contained necrotic tissue and only about 15% when it did not [cf. **32**, p. 276].

A disadvantage of the core-graft method is the failure of many grafts to survive incubation periods of 4–6 months, mainly because of fungal infection.

Nielsen (L. W.). **You can control scurf and black rot.**—*Bull. N.C. agric. Exp. Sta.* 408, 11 pp., 5 fig., 1958.

It is estimated that scurf (*Monilochaetes infuscans*) [cf. **37**, p. 558] costs the sweet potato growers of N. Carolina more than $100,000 annually, while even heavier losses are caused by black rot (*Ceratostomella* [*Ceratocystis*] *fimbriata*) [cf. **34**, p. 249; **35**, p. 546, *et passim*]. Essential information on both diseases is presented in popular terms and directions are given for their control by (1) the use of aerial stem cuttings (which are free from infection, the fungi attacking only the underground system) as planting material; (2) planting in clean soil; and (3) harvesting and storage in clean baskets and houses.

In comparative tests cuttings about 3 in. long produced no scurfy roots at harvest, whereas sprouts cut off at the root line or with the roots left on gave rise to 5·7 and 34·4%, respectively. Similarly in respect of black rot, roots from stem cuttings were completely healthy at harvest, while 1·9% infection occurred in those grown

from diseased sprouts. Moreover, the numbers of roots/plant produced by the 2 setting methods were 16·6 and 6·9, respectively.

The 1st yr. after inoculation there was no scurf on roots grown in Jamison sandy loam, a coarse soil with a low content of organic and mineral nutriment, whereas the percentages of infection in those grown in heavy Coxville silt loam (the highest in organic matter and minerals) and Norfolk fine sandy loam were 61·9 and 5·2, respectively. Only a few roots of the crop planted immediately after inoculation developed black rot at harvest and subsequent inspections revealed none.

Storage houses should be fumigated with chloropicrin ($\frac{1}{2}$ lb./1,000 cu. ft.) or ground S (1 lb.) or sprayed with copper sulphate (1 lb./10 gal. water), which may also be used on baskets. Successful fumigation necessitates an air-tight house, high humidity (walls, floor, and baskets should be hosed down or sprayed with at least 1 gal. water/1,000 cu. ft. 4–6 hr. before treatment), a min. temp. of 70° F., and closure for 24 hr.

John (K. P.). **Inoculation experiment with Fomes lignosus, Klotzsch.**—*J. Rubb. Res. Inst., Malaya*, **15**, 4, pp. 223–240, 9 pl. (24 fig.), 1 graph, 1958.

At the Rubber Research Institute Experiment Station, Sungei Buloh, Selangor, 20 roots $\frac{3}{4}$–2 in. diam. from 14 5-yr.-old and 20 from 10 25-yr.-old *Hevea* rubber trees were inoculated with *F. lignosus* [cf. **37**, p. 507; **38**, p. 275] by burying sections of naturally infected wood in contact with them. One month later an inspection hole (subsequently roofed with tiles and soil) was dug 1 ft. from the inoculum to expose about 7 in. of the proximal part of each root. The holes were opened at weekly intervals, the mycelium being removed with a stiff brush from the exposed section of one half of the roots of each age group. All 40 roots were dug out and examined after 1 yr.

The results (tabulated) showed that preventing surface growth on the 'treated' roots effectively checked internal extension of the disease for the duration of the experiment. After 1 yr. all the inocula were partially or completely disintegrated, their condition and lack of viability being in marked contrast to that of previous experience [cf. **33**, p. 256]. Cover plants hasten the decay, and in this experiment the feeding roots of the rubber appeared also to have assisted in the process.

The mean penetration of the fungus in control roots of the older trees was 38·7 in. and of the younger 13·6 in., the latter, apparently, being more resistant. Detailed examination of the roots indicated that resistance may arise in 3 ways. Primary resistance may come from the cork cambium, which reacts to invasion by proliferating to form patches of thick, corky bark which tend to crack longitudinally and to flake off. If the fungus reaches the wood, wound barriers may form. The final stage of the host reaction is callus formation, beginning at the edges of the lesion. In the experiment described, where penetration was partial, the fungus had stopped at, or just short of, the centre of the root.

The most striking finding is that by preventing external growth of the fungus the internal spread of infection is virtually arrested. This observation encourages the belief that chemical treatments may eventually play an important part in control. It was also established that wounds and lenticels are more readily invaded than intact bark.

The white root disease of Hevea, Fomes lignosus.—*Adv. Circ. Rubb. Res. Inst. Ceylon* 62, 5 pp., 1958.

In this publication, superseding Advisory Circular No. 46, directions are given for the curative and preventive treatment of young rubber trees against white root rot (*F. lignosus*) [**35**, p. 324] with tillex liquid [**38**, p. 98].

Diseases.—*Rep. Hawaiian Sug. Exp. Sta., 1958*, pp. 20–27, 6 fig., 2 graphs, 1958.

Red rot [*Glomerella tucumanensis*] is reported to occur in fields of 38–2915 on each

island [cf. **37**, p. 308]. Ratoon stunting was not widespread and was not found in commercial vars. In Dec. 1957 chlorotic streak [**37**, p. 181] symptoms developed on leaves of potted healthy plants with no root contact with diseased plants, though symptoms were present on neighbouring potted plants, on which there was a heavy infestation of sugarcane aphis [*Aphis sacchari*]. Rind disease accentuated by delayed harvest was found to be caused by *Pleocyta sacchari* [map 255]. A systemic fungicide, Bayer 22555, was highly effective against root rot (*Pythium* sp.) [**34**, p. 676], when applied to seedlings as a drench at 1 g./l. water/flat.

Further laboratory tests with fumigants on soil micro-organisms indicated that vapam was for all practical purposes as effective as DD in inhibiting nitrification of added ammonium sulphate for at least 8 weeks; 3,4-dichlorotetrahydrothiophene 1,1-dioxide (PRD) was less lethal to the nitrifying bacteria, and allyl alcohol [**36**, pp. 633, 809] the least toxic. After 16 weeks the nitrate accumulated in soils treated with allyl alcohol+ammonium sulphate was equal to that derived from the latter alone. The rates of nitrification in soils treated with DD or vapam were very low in the 1st 4 weeks, but increased later.

There was a 90% reduction in the total numbers of fungi in soils treated with vapam. Other fumigants had little or no effect on total numbers except allyl alcohol which increased the *Trichoderma* population by 1½–4 times. Methyl bromide at 1 l./100 feet² at a depth of 7 in. caused a marked increase in the number of bacteria and reduction in the total fungi for at least 14 weeks within a zone 6 in. round the point of injection, whereas *Trichoderma* had increased only within a narrow band in the same area at the end of 4 weeks, though increase was marked after about 8 weeks within a 5-in zone.

DD increased bacteria and actinomycetes, roughly 5 in. around the point of injection, whereas the fungus population was only slightly affected, but after 14 weeks *Trichoderma* was greater than in the control.

Trichoderma isolated from Ewa soil of pH 7 failed to inhibit *Pythium* root rot of seedlings, with the exception of isolate W-28, which appeared to have inhibited damping-off. The growth of seedlings in pots with *Trichoderma* alone appeared to have been stimulated.

Glover (P. M.). **Developments in power spraying.**—*Two & a Bud* (*News Lett. Toklai exp. Sta.*), **5**, 4, pp. 11–15, 1958.

The estimated annual 5–10% loss in tea yield, amounting to not less than 30–40 million lb., caused by plant diseases and pests could be considerably reduced by more efficient spraying. Many of the diseases which should be treated are protected by the dense upper foliage of the bush. Pneumatic air pressure knapsacks and the central charge pump remain the most efficient spraying methods available.

Two major developments have occurred since 1952: a practical method of spraying tea by means of spray fluid fed to lances under pressure, and the development of the aerosol sprayer [**38**, p. 162]. With the former, a power sprayer mounted on the hydraulic lift of a tractor, it is possible simultaneously to spray a strip of young or mature tea 100 ft. wide along both sides of any road suitable for the tractor. Five men can cover 1½ acres mature tea/hr. and more than twice this acreage of young tea. This sprayer is limited by its mobility, and must be supplemented by pack sprayers, but can be used as a central charge pump for these. It is also hoped to develop a straddle type chassis for harvesting tea which could be adapted for spraying.

Takahashi (W. N.), Karler (A.), & Knight (C. A.). **Electrochromatographic studies on infectious nucleic acid from Tobacco mosaic virus.**—*Virology*, **6**, 3, pp. 637–648, 2 fig., 1958.

In studies at the University of California and the California State Dept of Public

Health, Berkeley, when nucleic acid separated from purified tobacco mosaic virus by the phenol method [cf. **35**, p. 551] was subjected to fractionation by paper electrochromatography, the max. relative infectivity on half leaves of Xanthi tobacco did not, as a rule, coincide with the max. conc. nucleic acid. The highest relative infectivity occurred in 7 of 9 experiments in fractions farther from the anode than those containing the peak of nucleic acid.

Benda (G. T. A.). **The introduction of Tobacco mosaic virus into single hair cells of Nicotiana langsdorffii leaves.—II. The effect of ribonuclease.**—*Virology*, **6**, 3, pp. 718–724, 1 graph, 1958.

In further studies at the University of California, Berkeley [cf. **38**, p. 34], pancreatic ribonuclease, introduced with, before, or shortly after the green aucuba strain of tobacco mosaic virus into the same or neighbouring cells of an epidermal hair, inhibited lesion formation. It also did so when introduced into a cell through which the virus had to pass before it could reach the leaf from the inoculated cell.

Zaitlin (M.) & Boardman (N. K.). **The association of Tobacco mosaic virus with plastids. I. Isolation of virus from the chloroplast fraction of diseased-leaf homogenates.**

Boardman (N. K.) & Zaitlin (M.). **II. Studies on the biological significance of virus as isolated from a chloroplast fraction.**—*Virology*, **6**, 3, pp. 743–757; pp. 758–768, 1958.

At the Division of Plant Industry, Canberra, homogenates of Samsun tobacco leaves inoculated with strain U1 of tobacco mosaic virus were fractionated by centrifugation; the fraction sedimenting at 3,500 g yielded small amounts of virus, probably in the chloroplasts, which was released by subjecting it to hypotonic conditions or, more efficiently, by extraction with pH 8·7 borate buffer. Virus yields ranged from 0·6 to 4·2% of that isolated from the whole cell.

In part 2 results are presented which show that tobacco mosaic virus released from the chloroplast fraction by treatment with the borate buffer is metabolically distinct from that isolated from the rest of the leaf homogenate; the findings are consistent with the hypothesis that the virus protein is synthesized within the chloroplast, or that both protein and nucleic acid are assembled there. They also support the view that the soluble antigen is the precursor of the protein.

Aleksiev (A.). **Behandlung der Tabaksetzlinge mit Bordeaux Brühe, ein Mittel zur Bekämpfung mancher Tabakkrankheiten.** [Treatment of Tobacco transplants with Bordeaux mixture, a control measure for several Tobacco diseases.] —*Bulg. Ttiûiún*, **3**, 4, pp. 161–167, 1958. [Bulgarian, with English summary. *Tobacco Abstr.*, **2**, 11, p. 565, 1958.]

In 3-yr. trials in the Asenovgrad area black root rot [*Thielaviopsis basicola*], tobacco mosaic virus, and wildfire [*Pseudomonas tabaci*] were effectively combated and growth stimulated by treatment of seedlings immediately before transplanting with a mixture of 1·3% Bordeaux, fresh cattle dung, and loam. The incidence of disease was reduced 8–12 times and yield increased 15–25%.

Aleksiev (A.). Принос към проучаване средствата за борба срещу сеченето по Тютюневия разсад. [Contribution to the study of measures for the control of damping off in Tobacco seedlings.]—Науч. тр. М-во земед. гор., Сер. растениев. [*Nauch. Trud M-vo zemed. gor., Ser rasteniev.*], **25**, pp. 1–10, 1957. [Russian and English summaries. Abs. in *Referat. Zh. Biol., 1958*, 18, p. 209, 1958.]

At the Tabon Institute, Plovdiv, Bulgaria, a 3-yr. investigation on [unspecified]

damping-off of tobacco seedlings showed that $CuCO_3$ oxychloride and protill 42, applied in the soil before planting out, checked the disease and were harmless to the plants. Treating the seeds with the same compounds (not more than 60–100 g./sq. m.) is also recommended; Hg compounds must not be used for that purpose.

Gol'din (M. I.) & Yurchenko (M. A.). Прием борьбы с мозаикой и стриком Томатов. [Method for the control of mosaic and streak in Tomatoes.]—*Zashch. Rast., Moscow* [*Plant Prot., Moscow*], *1958*, 6, p. 36, 1958.

At the Vegetable-Potato Station in Kazakh S.S.R. a field sown directly with Mayak tomatoes contained only 5 plants infected by tomato mosaic [tobacco mosaic virus] (a new str. for the country), whereas in one to which the same var. had been transplanted 71% of the plants were heavily infected [cf. **38**, p. 227]. In fields sown with seed of Solodovnikova 93 and Stalingradska 95 obtained from non transplanted plants incidence was negligible. In similar tests with the tobacco vars. Alushta and Crimea, [unspecified] virus diseases were again reduced successfully.

Miller (P. M.) & Thornberry (H. H.). **A new viral disease of Tomato and Pepper.** —*Phytopathology*, **48**, 12, pp. 665–670, 1958.

A more detailed account from the University of Illinois, Urbana, of a virus found in Illinois on tomato in 1952 [**33**, p. 766] and on *Capsicum annuum* in 1953 and now named 'tomato atypical mosaic virus'. Although probably a strain of tobacco mosaic virus (TMV), it fails to cross protect against the latter in tomato. Field symptoms [loc. cit.] also differ from those of TMV; on capsicum they are not distinctive, the leaves being pale green with only slight interveinal chlorosis and no necrosis, with general plant vigour somewhat reduced.

Krivosheĭ (M. S.). Грибні хвороби деревних та чагарникових порід Тернопільської області. [Fungal diseases of trees and shrubs in the Ternopol region.]—*J. Bot. Acad. Sci., Ukr.*, **15**, 4, pp. 81–87, 1958. [Russian and English summaries.]

In 1953–56 in the Ukraine more than 150 spp. of fungi were identified as causing diseases of 70 tree and shrub spp. The most damage was caused by *Lophodermium pinastri*, very severe on young saplings of Scots pine (*Pinus sylvestris*) in the 2nd half of the summer, especially in wet seasons; *Phoma pinastrella*, *Hendersonia acicola*, and *Valsa pini* were not as widespread. Other records were: *Septoria populi* on poplar and *S. piricola* on pear; *Clasterosporium carpophilum* [map 188] on plum; *Cylindrosporium* [*Gloeosporium*] *tremulae* on poplar and *C.* [*G.*] *maculans* on mulberry, both of which caused severe dying-off; *Schizophyllum commune* on apple, oak, hornbeam, ash, maple, poplar, and willow; *Coniothyrium olivaceum* on Indian bean (*Catalpa bignonioides*) and walnut. *Cytospora salicis*, *Valsa salicina*, *Tubercularia volutella*, *Phoma salicis*, and *Dothiorella pyrenophora* caused severe damage to willow trees; *Thelephora terrestris* to pine saplings [**37**, p. 558]; and *Tubercularia vulgaris*, *Diplodia juglandina*, and *Phoma juglandina* were severe on walnut.

Prŷsyazhnyuk (A. A.). Мікафлора насення драўняных і куставых парод. [Fungal flora in plantations of trees and shrubs.]—Вес. Акад. Нав. Мінск, Сер. Биял. [*Ves. Akad. Nav., Minsk*, Ser. Byal.], *1958*, 3, pp. 44–57, 1958. [31 ref.]

A report of studies since 1946 by the White Russian Forestry Institute, Minsk; 301 spp. of fungi from forests and parks are listed systematically and their pathogenicity to different hosts indicated.

Karangauz (R. A.) & Kalinichenko (N. P.). Сохранить Клен остролистный в степных лесонасаждениях. [Preservation of laciniate-leaved Maple in the

steppe forests.]—Лесн. Хоз. [*Lesn. Khoz.*], **10**, 11, pp. 49–51, 2 fig., 1957. [Received 1958.]

In the Great-Anadol' forests, U.S.S.R., since 1952–3 there has been an increased wilting of maple (*Acer* spp.), followed by death; by 1955–6 60–80% of trees of all ages were lost. It was attributed at first to *Massaria inquinans*, isolated from necroses in the bark and branches, but subsequent investigations have shown that *Verticillium dahliae* [**37**, p. 378] is responsible; it kills 5–10 yr. old trees in 2 seasons. Infection is spread mainly by root contact; transmission through the branches, bark, and leaves is rare. *A. platanoides* and *A. saccharum* proved the most susceptible. Since 1952 the wilt has spread to the Shaitansk, Malo-Lanisol', Stavropol', and Rostov regions, but in the last there are only isolated infections. Felling and destroying infected trees when the symptoms first appear, treating the stumps with equal parts of creosote and coal tar, and sowing only selected seed on plots not previously sown with tomatoes, potatoes, or sunflower are recommended. Smoke trees [*Cotinus coggygria*] are also highly susceptible [cf. **38**, p. 103].

Itô (K.) & Shibukawa (K.). **Studies on some anthracnoses of woody plants.—IV. A new anthracnose of Acacia with special reference to the life history of the causal fungus.**—*Bull. For. Exp. Sta. Meguro* 92, pp. 51–64, 3 pl., 5 fig., 1956. [Japanese and English.]

A disease of *A. dealbata* [cf. **35**, p. 249] destroyed nearly half the seedlings in a nursery bed at Meguro, Tokyo, in the summer of 1950. First symptoms were punctate brown lesions, which later enlarged to 5–10 mm. diam. and became dark brown. All above-ground parts were attacked. During wet periods the lesions elongated, coalesced, and often girdled the stems and petioles, causing a rapid wilt, early defoliation, and subsequent death of the shoot. Invasion of young shoots was especially rapid and severe. Some seedlings had dead tops with a few basal living branchlets. Under humid conditions salmon pink masses of conidia were produced abundantly on the lesions and towards the end of Oct. small, dark brown to black, scattered perithecia appeared. Monospore isolates from the *Colletotrichum* conidia and the *Physalospora* ascospores were similar in culture. On seedlings of *A. dealbata* and *A. mollissima*, inoculated with a conidial suspension, symptoms appeared after 7 days and numerous acervuli a week later; in 5 weeks all the seedlings were dead, whereas inoculated *Robinia pseudoacacia* and *Amorpha fruticosa* were hardly affected. There were no differences in pathogenicity between the conidial and ascospore isolates; both produced typical acervuli and conidia on acacia seedlings and re-isolations were made. The fungus is described as a new sp., *P. acaciae* K. Itô & Shibukawa (syn. *Colletotrichum acaciae* K. Itô & Shibukawa) [cf. **31**, p. 577], with perithecia 54–141 × 60–114 μ; asci 36–60 × 6–9 μ; ascospores 10–15 × 3–6 μ.

Itô (K.) & Shibukawa (K.). **Notes on some leaf-spot diseases of broadleaved trees —III. Septoria leaf spot of Alnus.**

Itô (K.) & Kobayashi (T.). **IV. A new species of Sphaerulina causing frosty mildew of Walnut trees.**—*Bull. For. Exp. Sta. Meguro* 92, pp. 65–80, 4 pl., 6 fig., 1956; 96, pp. 37–68, 5 pl., 8 fig., 1957. [Japanese and English.]

In inoculation experiments in the greenhouse [cf. **32**, p. 405] *Septoria alni*, widespread on alder throughout Japan [**34**, p. 411], was pathogenic to *A. japonica*, *A. alnobetula* var. *fruticosa*, and *A. tinctoria* var. *glabra* (incubation period 7–14 days), and to *A. firma* vars. *multinervia* and *sieboldiana* (16–18). The fungus commonly overwinters in the field as immature pycnidia in dead leaves, and in Tokyo pycnidiospores were newly formed as early as mid-Feb.

Mycosphaerella alni was collected on green leaves of *A. tinctoria* var. *glabra* in

Iwate prefecture and *M. alni-viridis* on overwintered fallen leaves of *A. firma* var. *sieboldiana* in Tokyo. The supposition that *M. alni-viridis* might be the ascigerous state of *S. alni* was disproved by comparison of cultures and pathogenicity tests.

A study of the morphology, physiology, parasitology, and life cycle of *Sphaerulina juglandis* Itô & Kobayashi on *Juglans sieboldiana*, *J.s.* var. *cordiformis*, and *J.* sp. showed that in addition to the conidial state (*Cercosporella juglandis*) the pathogen produced spermogonia and perithecia (maturing in spring) on fallen, decaying leaves. Detailed experiments confirmed the genetical relationship between *C.* and *S.*; inoculations showed that the disease is apparently limited to *Juglans*.

Clark (J.) & Barter (G. W.). **Growth and climate in relation to dieback of Yellow Birch.**—*For. Sci.*, **4**, 4, pp. 343–364, 1 fig., 8 graphs, 1 diag., 1 map, 1958. [45 ref.]

As reduction of radial growth of yellow birch (*Betula alleghaniensis*) due to dieback [cf. **38**, p. 228] proved to be simultaneous throughout the tree, d.b.h. was used to compare growth behaviour with that of sugar maple (*Acer saccharum*), which is not affected by die-back. Observation showed that 90% of the radial increment of yellow birch was in June–Aug., and until the onset of dieback the growth curve of birch was similar to that of sugar maple, but thereafter that of birch markedly declined for a long period, while that of maple fluctuated normally. Growth of birch is related to the June–Aug. water balance, when the precipitation is often inadequate to counter the high water utilization induced by warm weather and low rainfall in Apr.–May. Yellow birch reacts differently to drought and dieback. Records show that in high vigour trees in a drought period in the 1920's growth was reduced by 42%, compared with 53% in low vigour trees; in the early years of dieback these figures were 56 and 37%. Dieback appears to have spread from central New Brunswick.

Analyses of climatic data by Thornthwaite's water balance technique (*Unasylva*, 9, pp. 51–59, 1955) indicates that dieback is not a purely physiological disturbance; these facts, together with the evidence of spread and the description of typical virus symptoms [**36**, p. 795] suggest that birch dieback is an infectious disease.

Shigo (A. L.). **Fungi isolated from Oak-wilt trees and their effects on Ceratocystis fagacearum.**—*Mycologia*, **50**, 5, pp. 757–769, 2 fig., 1958.

An investigation at West Virginia University, Morgantown, from 1956–57 into the possibility that the girdling of oak trees affected by *C. fagacearum* [cf. **37**, p. 741, *et passim*] to control spread may result in conditions favouring the growth of fungi antagonistic to the wilt [**37**, p. 318] included a taxonomic study of the natural succession of fungi in affected trees, a physiological study of the fungi commonly isolated, and an ecological study to determine whether certain treatments applied to inoculated trees would affect the growth and sporulation of *C. fagacearum*.

Fungi belonging to over 50 genera were isolated from wilted trees. Of these, some were antagonistic to *C. fagacearum* in mixed cultures. *Hypoxylon punctulatum* was isolated frequently from girdled trees sampled late in the year; for example it was present in 56% of 117 such trees sampled in Nov. 1956. The fungus causes a rapid decay of the sapwood; fungal mats of *C. fagacearum* were not found on deep-girdled trees producing stromata of *H. punctulatum*. *Gliocladium roseum*, growing on many mats, was isolated in 1956 from the wood under 49 of 58 mats cultured; it destroyed all the fungi paired with it in culture, killed off established Petri-dish cultures of *C. fagacearum*, but failed to inhibit its growth in trees.

Fewer genera of fungi were isolated from inoculated than from naturally infected oak-wilt trees. *Graphium rigidum* was isolated frequently from vector infected oak-wilt trees, but only occasionally from inoculated.

Kartavenko (N. T.). Значение притенения в борьбе с мучнистой росой (**Microsphaera alphitoides Griff. et Maubl.**) Дуба в лесостепи Зауралья. [The importance of shading in the control of Oak mildew (*M. alphitoides*) in the Trans-Ural forest steppe.]—*Bot. Zh. U.S.S.R.*, **43**, 3, pp. 399–400, 1958.

In tests in 2 districts in the Chelyabinsk region, U.S.S.R., acorns were planted in plots in which oats, followed by sunflowers, were also sown for shading. The incidence of mildew (*M. alphitoides*) [**37**, p. 379] was 2·4% compared with 29·2% in seedlings without shading.

Orlova (Mme A. A.) & Evseenko (I. D.). Новые данные по биологии гриба **Stromatinia pseudotuberosa Rhem.** [New data on the biology of the fungus *S. pseudotuberosa*.]—*Bull. Soc. Nat. Moscou*, Sect. biol., N.S., **63**, 6, pp. 95–99, 1958. [English summary.]

At Pushkino, Az.S.S.R., completely mummified acorns or those with ½ or ⅓ of the inner cotyledon surface infected by *S.* (*Sclerotinia*) *pseudotuberosa* [**37**, p. 558] were sown with equal numbers of healthy acorns. None of the mummified acorns had germinated 40 days after sowing; 64 and 71%, respectively, of the partly infected ones and all the uninfected had grown. After 50 days no mycelium had grown into the soil and there was no infection of healthy acorns or seedlings; growth of the seedlings from diseased acorns was slightly retarded.

Arkhipova (Mme V. D.). Розвиток мікоризи на корінцях сіянців які виросли з жолудів протруених фунгісидами. [Development of mycorrhiza on roots of seedlings grown from fungicide-treated acorns.]—*J. Bot. Acad. Sci., Ukr.*, **15**, 4, pp. 75–80, 1 fig., 1958. [Russian and English summaries.]

In 1954 in 3 zones (forest, forest-steppe, and steppe) of Ukraine 1–3-yr.-old oak seedlings from acorns treated with granosan and formalin solution were investigated for mycorrhiza. There was no difference between seedlings from treated and untreated. When seedling roots and cotyledons were clipped at the 1st stage of development it was established that the death of weak seedlings may be due to the early loss of the cotyledon. It appears that fungicide treatment does not exert a deleterious effect on the development of mycorrhiza.

Gremmen (J.). **Bijdrage tot de biologie van Cryptodiaporthe populea (Sacc.) Butin (Dothichiza populea Sacc. et Bri.).** [Contribution to the biology of *C. populea* (*D. populea*).]—*Korte Meded. Sticht. Bosbouwproefsta. 'De Dorschkamp'* 36, pp. 251–260, 5 fig., 1958. [English and German summaries.]

Perithecia detected in Apr. 1958 on poplar branches killed by bark canker had ostioles 200 μ long which erupted through the periderm in groups of 4–10, and asci with hyaline spores 17·3–19·2 × 7·5–8·5 μ with 2–3 cells, which were identified by Butin as belonging to *C. populea* [**38**, p. 104]. After 4 weeks on malt agar the ascospores produced typical pycnidia of *D. populea*. This is the 1st record of the perfect state in the Netherlands, where it was found later in the same season in 2 other localities.

The perithecia develop much later than the pycnidia, which are the principal source of infection, being produced intermittently throughout the year except during hot and dry or frosty spells, with a peak May–June, sometimes followed by another in Sept.–Oct., the latter being probably associated with premature leaf fall due to a heavy attack of rust (*Melampsora* spp.) [**34**, p. 685].

The results of inoculation experiments with pycnidiospores showed that the fungus is able to enter through bud scale scars on newly formed shoots of 1-yr. rooted cuttings of var. Robusta and remain latent until the host is weakened, e.g. by transplanting. Thus, severe bark necrosis developed in June 1958 on all of 70 cuttings inoculated 2 yr. earlier.

Control should be based on nursery sanitation and the use of resistant clones.

C. populea was accompanied on the dead material by *C. salicella* [**38**, p. 104], [and its conidial state] *Discella carbonacea*, *C. candidum*, *Cytospora chrysosperma* [*Valsa sordida*], *Physalospora miyabeana* [cf. **31**, p. 478], *Stereum purpureum* [cf. **36**, p. 330], and other unidentified spp.

[This paper also appears in *Ned. Bosh Tijdschr.*, **30**, pp. 251–260, 1958.]

Nohara (Y.) & Zinno (Y.). **Experiments on the control of damping-off of Conifer seedlings. (1) Effect of soil treatment with pyroligneous acid.**—*Bull. For. Exp. Sta. Meguro* 96, pp. 105–128, 4 pl., 5 fig., 2 graphs, 1957. [Japanese. Abs. from English summary.]

In laboratory tests the toxicity of pyroligneous acid [**36**, p. 219] to [unspecified] damping-off fungi varied according to its source and conc. in the agar medium. Acetic acid content appeared to be a determining factor and the fungitoxic components were mostly separable by distillation at 100° C. Fungitoxicity increased with sp. gr. and was reduced on neutralization.

At all nurseries where field experiments were made pyroligneous acid was the most effective of the chemicals tested for the control of damping-off of *Larix kaempferi*, *Pinus densiflora*, *Chamaecyparis obtusa*, *Cryptomeria japonica*, and *Zelkova serrata*, soil treatment with the mother liquor producing the best results. The acid also stimulated the top growth of seedlings and destroyed weeds. Soil pH returned to its original value in 5–7 days. Treatments should be made at least 5 days before sowing to avoid damaging the plants. Applied at 1:5 after germination the acid caused some injury, which varied according to the species.

Terashita (T.) & Zinno (Y.). **Fungicidal effects of pyroligneous acid.**—*Bull. For. Exp. Sta. Meguro* 96, pp. 129–144, 1 diag., 2 graphs, 1957. [Japanese. Abs. from English summary.]

In laboratory tests at Meguro, Tokyo, vapour of undiluted pyroligneous acid (PA) [see above] prevented the mycelial development of *Fusarium oxysporum*, *Rhizoctonia* [*Corticium*] *solani*, and *Rosellina necatrix* and there was little difference in the effect of acetic acid at a similar conc. Sediments of PA, washed with distilled water before drying, showed no fungitoxicity but unwashed sediments and ceresan completely inhibited growth.

Conidia of *Alternaria kikuchiana*, *Cochliobolus miyabeanus*, and *Fusarium* sp. (LK-18) germinated poorly on crude or sediment-free PA at 1:125 but fairly well (76, 91, and 84%, respectively) on neutralized PA at a 1:5 conc., in soil-filtered, and on the residual liquid after steam distillation.

Mycelial disks of *F. oxysporum*, *Corticium solani*, and *R. necatrix*, 10 mm. diam., were killed when immersed for 24 hr. in crude or sediment-free PA at 1:5, 1:25, and 1:125, respectively.

Applied by a modification of Zentmyer's drench method [**35**, p. 30] undiluted PA killed all 3 spp. in disks at a depth of ½ in. and, diluted 1:5, *C. solani* and *R. necatrix* at ¼ in. Uspulun 1:100 killed none of the fungi at ¼ in. PA was not influenced by soil moisture content, but was more effective in sand than in loam.

It is concluded that the failure of PA against damping-off of conifer seedlings in nurseries in Yamagata Prefecture and Hokkaido, where the dominant pathogens are *F.* spp., may be partly explained by the relative resistance of *F. oxysporum* as shown in these experiments.

Thomas (G. P.). **Studies in forest pathology. XVIII. The occurrence of the Indian paint fungus, Echinodontium tinctorum E. & E., in British Columbia.**—*Publ. Dep. Agric. Can. For. Biol. Div.* 1041, 30 pp., 2 pl. (12 fig.), 1 map, 1958. [29 ref.]

A survey [cf. **37**, p. 687] in B.C. showed the increasing abundance of this fungus

from W. to E. and from N. to S., and its absence in 16 of 50 recognized forest types despite the presence in all of 1 or more natural hosts. Its distribution and abundance are seemingly dependent on the summer climate and of the inherent susceptibilities of the hosts, while altitude, topography, and the characteristics of individual trees are indirect factors concerned. High average summer temp. and high humidity are conducive to disease development; but infection is largely confined to the part of the trunk exposed to atmospheric conditions favouring the fungus, which in some areas are confined to the upper portions. The ability of hosts to escape infection in their natural habitats varies considerably; *Abies* spp. are more prone to infection than *Tsuga*, *Picea* spp., or *Pseudotsuga menziesii*. Trees with impaired vigour are more susceptible; when conditions for infection occur only high above the ground, trees which do not occupy the highest canopy escape, e.g. *A. amabilis* in 3 of its 24 natural habitats.

Kobayashi (T.). **Another sclerotial disease of Japanese Cedar, Cryptomeria japonica D. Don, caused by Sclerotinia libertiana Fuckel.**—*Bull. For. Exp. Sta. Meguro* 96, pp. 1–16, 5 pl., 2 fig., 2 graphs, 1957. [Japanese. Abs. from English summary.]

In 1953 *S. sclerotiorum* was found infecting *C. japonica* in snow-free, warm regions of the Tôhoku district [cf. **37**, p. 744]. Green stems and needles were attacked, the lesions spreading rapidly and withering the shoots, which became greyish brown to ash-coloured and fragile. Sclerotia (3–8×2–5 mm.) were produced on dead stems and needles. The opt. temp. for apothecial development (May to early June, and Oct. to early Nov.) was about 15° C. Good growth and many sclerotia were obtained on potato sucrose, malt, and Waksman's agar media; opt. temp. for growth was 25°, none occurring at 35°, and very little at 0°. The ascospores germinated at —1° to 35° (opt. 20–25°). On inoculation the fungus caused serious infection of *C. japonica*, *Pinus densiflora*, and *Larix kaempferi*, and rot of rape, *Digitaria ciliaris*, *Setaria viridis*, and *Stellaria media*.

Kobayashi (T.). **Studies on the shoot blight disease of Japanese Cedar, Cryptomeria japonica D. Don, caused by Guignardia cryptomeriae Sawada.**—*Bull. For. Exp. Sta. Meguro* 96, pp. 17–36, 2 pl., 10 fig., 1 diag., 2 graphs, 1957. [Japanese. Abs. from English summary.]

In 1954 *G. cryptomeriae* caused serious shoot blight in young plantations of *C. japonica* in the Kyushu district. Green and brown shoots were attacked from spring to autumn, the reddish brown, irregular lesions girdling the stem, which became withered; affected young trees died within 1 month. *Macrophoma sugi*, pycnidia of which were found on the lesions in association with the *Guignardia* perithecia, was shown to be the imperfect state. Growth on agar occurred at 8–35° C. (opt. 25°) but not at 40° or below 4°, and it was reduced only at the lowest pH in the range 4–7. Ascospores were discharged at 13–35° and germinated over the same range (opt. 25–28°); pycnidiospores germinated at 4–35°, but not at 40° or below 1°. On inoculation, besides *C. japonica*, *Chamaecyparis obtusa* and *Larix kaempferi* were susceptible. Old shoots were invaded through dead tissues and younger ones through wounds. The scratched wounds caused by wind were shown to be an important predisposing factor, plants placed in a wind tunnel being successfully inoculated afterwards. Many infections observed in the field could have started from cracks in the bark, the cause of which was unknown.

Itô (K.), Satô (K.), & Ôta (N.). **Studies on the needle cast of Japanese Larch—I. Life history of the causal fungus, Mycosphaerella larici-leptolepis sp. nov.**—*Bull. For. Exp. Sta. Meguro* 96, pp. 69–88, 4 pl. (1 col.), 2 fig., 1 diag., 1 graph, 1957. [Japanese and English.]

This disease has become prevalent in the last decade, and is probably widespread

throughout most of Japan especially in the Kô-shin-etsu, Tôhoku, and Hokkaido districts. Heavy, repeated attacks can be very destructive. During the 1st week of July minute, scattered, brown spots with a yellow halo appear on the needles, increasing and coalescing until about 1 mm. wide. There are usually 5–7 lesions/needle, rarely 20, and small, black spermogonia are borne on the upper surfaces of the discoloured areas. From a distance the affected trees appear as if scorched by fire or injured by late frost. Perithecia are formed in fallen needles attacked the previous year. *M. larici-leptolepis*, described by the authors as new (syn. *Phyllosticta laricis* Sawada), has cylindrical-clavate asci 44–99×7–12 μ, with hyaline ascospores 11–18×3–5 μ, unequally bicellular and constricted at the septum. *Phoma yano-kubotae*, to which the disease had been previously ascribed, is the spermogonial state. Ascospores, which are the source of inoculum, are disseminated from late May to mid-July. On inoculation only Japanese larch was attacked, the incubation period being about a month.

Hopkins (J. C.). **Cultural studies on Atropellis piniphila.**—Abs. in *Proc. Canad. phytopath. Soc.*, **26** (*1958*), p. 12, 1959.

The blue-black wood in cankers of several lodgepole pines [*Pinus contorta* var. *latifolia*] in Alberta yielded isolates of *A. piniphila* [**37**, p. 116]; none were obtained from the reddish brown incipient zone of the canker, which was devoid of mycelium. Cultures from cankers were similar to those from ascospores of *A. piniphila*. Growth, generally slow, was most rapid on oat dextrose and soya dextrose agars, was slightly reduced at 10° C. (opt. 18°), and ceased at 29°; opt. pH value was 4. The fungus was thiamine deficient.

Cartwright (K. St.G.) & Findlay (W. P. K.). **Decay of timber and its prevention.** —xv+332 pp., 57 pl., 10 fig., London, H.M. Stationery Office, 1958. 27*s.* 6*d.*

A revised and more profusely illustrated 2nd edition of this publication [cf. **27**, p. 52]. A chapter deals with the prevention of disfiguring stains, of increasing importance in modern furniture.

Kowalska (Eugenia). **Impregnacja drewna drogą wytwarzania fluorokrzemianu sodu wewnątrz komórek drewna.** [Impregnation of wood by the formation of sodium fluorosilicate inside the wood cells.]—*Przem. chem.*, **37**, 6, pp. 421–425, 5 fig., 1958. [Russian and English summaries.]

A new method described from the Silesian Polytechnic consists in consecutive saturation with NaCl and H_2SiF_6 solutions, which has been shown by X-ray technique to produce within the cells Na_2SiF_6, soluble only with difficulty. The treatment is $\frac{1}{6}$ as costly as impregnation with fluralsil, which is widely used in Poland; standard methods demonstrated its efficiency in reducing decay by *Coniophora cerebella* [*C. puteana*] in pine wood blocks.

Popov (V. I.). Сосудистый бактериоз Капусты. [Vascular bacteriosis in Cabbage.] —*Zashch. Rast., Moscow* [*Plant Prot., Moscow*], *1958*, 6, p. 55, 1958.

Recommendations for the control of cabbage bacteriosis [*Xanthomonas campestris*] in the Voronezh region, U.S.S.R. [**38**, p. 169], include dusting the seeds with NIUIF 1 and granosan or soaking them for 20–25 min. in hot water 50° [C.]; disinfecting the wooden parts in the greenhouse with 1:100 formalin; and a rotation with an interval of at least 3 yr. between cabbage crops.

Böning (K.). **Untersuchungen über die Schwärze (Verticilliose) des Meerrettichs.** [Investigations on blackening (verticilliosis) of Horse-radish.]—*Z. PflKrankh.*, **65**, 9, pp. 513–529, 2 fig., 1958. [English summary.]

At the Abteilung Pflanzenschutz der Bayerischen Landesanstalt für Pflanzenbau und Pflanzenschutz, Munich, Germany, stable manure decreased the incidence of

root blackening [*Verticillium dahliae*: cf. **34**, p. 503] in horse-radish, as well as improving yield. Strong liming increased the severity of attack, as did insufficient K or application only of N fertilizers; heavier applications of K and P are, however, not recommended, as they depress yield.

Hildreth (R. C.). **Genetic variation and variability of Fusarium solani f. pisi and F. oxysporum f. pisi race 2.**—*Diss. Abstr.*, **18**, 4, p. 1196, 1958.

Comparisons at the University of Minnesota of 13 monoconidial isolates of *F. s.* f. *pisi* [**36**, p. 815; **37**, p. 633] selected from 150 mass cultures from root-infected pea plants in the State and of 4 monoconidial isolates of *F. o.* f. *pisi* race 2 from Wisconsin, indicated an extensive range of cultural and genetic variation, which often resulted in considerable overlapping of the cultural characteristics and even made it difficult, if not impossible, to distinguish between certain isolates of the 2 spp. Close similarities in virulence and symptom development were observed; thus, *F. s.* f. *pisi* invaded the upper stem of the pea plant far beyond its normal cotyledonary region, with a vascular penetration similar to 'near wilt'. Similarly *F.o.* f. *pisi* produced root rot in Perfected Wales and New Era identical with that produced by *F. s.* f. *pisi* accompanied by severe cortical decay, a feature used to diagnose *F. s.* f. *pisi*.

Sempio (C.) & Caporali (L.). **L'Uromyces appendiculatus sul Fagiolo e su altre specie : virulenza e specializzazione.** [*U. appendiculatus* on Bean and other species: virulence and specialization.]—*Ann. Fac. Agr. Perugia*, **13**, pp. 233-277, 63 fig., 1958. [English summary, pp. 273–276.]

After reviewing investigations on the ability of various parasitic fungi to penetrate hosts other than those they normally parasitize, the authors describe studies on virulence in relation to specialization in which *U. appendiculatus*, which completes its life-cycle (up to the formation of uredosori) in certain species of *Phaseolus* and cowpea only, was inoculated into susceptible (Cannellino Extra) and resistant (Spagnone) vars. of *P. vulgaris*, also into 2 vars. of broad bean, and into clover, lucerne, radish, Chinese cabbage, tobacco, tomato, vine, wheat, and oats. After 12, 24, 36, 48, and 60 hr. pieces of the inoculated leaves were clarified in conc. chloral hydrate for 1 week.

The promycelium passed through a stoma after forming an appressorium over it and then formed a vesicle in the substomatal chamber from which 1 or more infective hyphae developed. The mycelium spread into the tissues of nearly all spp., with the development of clearly visible haustoria in many. In the Dicotyledons no correlation was established between intensity of infection and the systematic affinity of the host. Thus, tomato was invaded more than lucerne or clover, while tobacco was the most resistant. Immunity, as judged by the incapacity of the pathogen to penetrate the host tissues, was manifested not merely by stomatal 'indifference' or repulsion but also by an anti-germinative effect on the spores.

It is concluded that the virulence and high degree of specialization of *U. appendiculatus* and other obligate parasites appear to be related to the ability of the host tissues to provide the parasite with a continual nutritional stimulus, to the absence in the host of substances toxic to the parasite, to the inability to form them as a reaction to parasitic attack, and also to the absence of antagonism by the host in co-existing with the parasite and rapidly metabolizing the products of exchange.

Gorter (G. J. M. A.) & Krüger (W.). **The effect of seed protectants on emergence of Groundnuts.**—*S. Afr. J. agric. Sci.*, **1**, 3, pp. 305–313, 1958. [Afrikaans and French summaries.]

In 5 field trials at the Potchefstroom College of Agric. in which 38 dry seed dressings were tested for effectiveness against pre-emergence losses in groundnut [cf. **33**, p.

66] the best results were obtained with preparations based on thiram and with bioquin 1. Spergon and the organic mercury compounds were not quite so effective, except cerenox special, which was equal to thiram. An application of 1 g./lb. (2 g./kg.) was more effective than 0·5 g. Increases in emergence of groundnuts as a result of treatment depend, in addition to type and dosage of dressing, on the quality of the seed and conditions at planting time.

Vuittenez (A.). **Méthodes de lutte contre la bigarrure de l'Oignon.** [Methods of controlling yellow dwarf of Onion.]—*Journées Fruit. Maraich. Avignon, 1957*, pp. 57–68, 13 fig., 1957. [Received Feb. 1959.]

During the past 10 yr. there have been serious losses of onions in market gardens in E. France from yellow dwarf virus disease [cf. **33**, p. 707]. All vars. of yellow onion grown locally (for winter use) are susceptible. A grower attempting to control the disease individually should plant onions in fields containing no 2nd yr. onions and no seedbearers. Isolating plantings 500–1,000 m. from a reservoir of the virus for 3 yr. gave more than 80% healthy seed-bearers and a yield of seed double that obtained from bulbs not isolated the yr. before. A scheme is outlined whereby onions raised in isolation outside an intensive market-gardening area can be used the following year to provide planting material for the latter, a practice which, if persisted with, should eliminate the disease throughout the area in 3 yr.

Smolák (J.). **Virová deformita Celeru.** [Virus deformity in Celery.]—*Sborn. Vysoke Šk. Zeměd. Praze, 1957*, pp. 181–188, 2 fig., 1957. [Russian and German summaries. Received Jan. 1959.]

A preliminary report is given on a new virus disease of celery, recorded first in Branike, Czechoslovakia. The infected plants have shrivelled leaves with wrinkled edges and in severe cases seem to lose chlorophyll rapidly, which gives the leaves a whitish appearance. Seeds from such plants are small, shrivelled, and sterile. Plants also have mosaic symptoms. The pathogen is not yet identified, although it resembles in some aspects the lucerne mosaic virus. Aphids are possible vectors of the disease, which is spreading rapidly.

Melikova (Mme S. A.). Черная пятнистость плодов Перца. [Black spot on Sweet Pepper.]—*Zashch. Rast., Moscow* [*Plant Prot., Moscow*], *1959*, 1, p. 54, 1959.

Recently black spot (*Pseudomonas syringae* var. *capsici*) has spread rapidly in sweet pepper [*Capsicum* sp.] in the Krasnodar area, U.S.S.R. In dry weather the spots increased <2–3 cm., becoming necrotic and infected by *Alternaria* sp. Spraying at the bud stage and 2 or 3 times later with 1% Bordeaux decreased incidence by 13·5%. From the VIR collection, 1589, 1591, Rotunda 449, and Otborniĭ severni are fairly resistant.

Romanovich (E. A.). Новая болезнь Кабачков. [New disease of Pumpkins.]—*Zashch. Rast., Moscow* [*Plant Prot., Moscow*], *1958*, 6, pp. 53–54, 1958.

From the Dzau Dzhikan (Orjonikidze) Agricultural Institute is reported infection of pumpkin flowers and fruit, caused by *Pythium aphanidermatum* [cf. **5**, p. 71], hitherto unrecorded in the country [map 309]. The disease, which is widespread, occurs where pumpkins are sown after Solanaceae, incidence often reaching 50%. Seed should be collected from healthy plants and dusted with granosan, a 3-4 yr. rotation observed, and the plants sprayed with 0·5–1% Bordeaux mixture every 10 days during the growing period.

Chant (S. R.). **A note on the inactivation of mosaic virus in Cassava (Manihot utilissima Pohl.) by heat treatment.**—*Emp. J. exp. Agric.*, **27**, 105, pp. 55–58, 2 pl., 1959.

At the Dept of Agricultural Research, Ibadan, Nigeria, cassava mosaic virus was

inactivated in infected cuttings grown in an incubator at 35–39° C. for 28–42 days [**37**, p. 635]. More healthy plants (4 of 25 treated for 42 days) were obtained at 39° than at 37° (2), though only 8 survived as against 12.

Green shoots produced during the heat treatment, removed immediately afterwards, and rooted separately, gave healthy plants though their parent plants developed symptoms after some weeks in the greenhouse.

Henner (J.). **Ein sprunghaftes Ansteigen der Rotbrennerschäden.** [A sudden increase in rotbrenner damage.]—*Pflanzenschutz*, **11**, 10, pp. 112–113, 2 fig., 1958.

The author attributes the general outbreak of *Pseudopeziza tracheiphila* on vine in Austria in 1958 to light rains in June after a long, dry, hot period. The rains sufficed to induce ascospore discharge and permit the establishment of infection [cf. **37**, p. 131].

Shterenberg (P. N.). Эпифитная микофлора Виноградной лозы. [Epiphytic fungus flora of Vine.]—*Agrobiology, Moscow, 1959*, 1, pp. 49–53, 1959.

At the Ukrainian Viticultural and Winemaking Research Institute, Odessa, washed vine roots, despite treatment with 50% alcohol, garlic phytoncides, or other disinfectants, were rapidly covered by *Fusarium* spp. when cultured in liquid glucose, grape juice, or several synthetic media. *F.* spp. were predominant (56%) not only in the roots but also in the green parts. In frozen dead parts *Botrytis cinerea* was predominant, followed by *Macrosporium* [*Alternaria*] *vitis* and *A.*sp. *Sclerophoma* sp. was isolated mainly from the floral tissues and *Coniothyrium* [*Coniella*] *diplodiella* from the fruit and leaves. *Trichothecium plasmoparae* was found to parasitize *Plasmopara viticola* [cf. **37**, p. 647] (and also *Venturia pirina*).

Jahresberichte der Pflanzenschutzämter 1957. [Annual reports of the Plant Protection Bureaux 1957.]—264 pp., Biologische Bundesanstalt für Land- und Forstwirtschaft, Brunswick, 1958.

This report follows the usual lines [cf. **36**, p. 753].

Plant Pathology Division.—*Rep. Dep. Agric. Mauritius, 1956*, pp. 54–57, 1958.

In this report [cf. **37**, p. 205] gummosis on *Eucalyptus tereticornis* and *E. citriodora*, the cause of which is unknown, is noted. This disease is characterized by a copious exudation of dark-coloured gum at places on the stem, drying out into hard resinous masses; death of the tree follows severe attack. A disease killing Cavendish banana plants was attributed to a basidiomycete but no fructifications were obtained. Coffee rust (*Hemileia vastatrix*) was once found parasitized by *Verticillium* sp., probably *V. hemileia*. Young tea plants were attacked by the gemma fungus disease [cf. **31**, p. 538], resulting in leaf spotting and defoliation. There was a severe attack of black mould of onion (*Macrosporium parasiticum* [*Pleospora herbarum*]) despite spraying with perenox. Dwarf bean plants [*Phaseolus vulgaris*] from Rodriguez island were affected by halo blight (*Pseudomonas medicaginis* f. sp. *phaseolicola*) [map 85].

Akenhead (D.). **Horticulture in the British Commonwealth. An outline 1958.**—*Tech. Commun. Bur. Hort., E. Malling*, 26, 63 pp., 1958.

This compilation is based on information obtained from the British Commonwealth countries, Northern Ireland, and the Republic of the Sudan concerning the horticultural endeavours at their various experimental centres. Relevant references to plant pathological investigations are included.

Hey (G. L.) & Marshall (K.). **The control of pests and diseases in agricultural and horticultural crops.**—172 pp., 6 pl. (19 fig.), 1 fig., London, Vinton & Co. Ltd., 1958. 12*s*. 6*d*.

A useful handbook outlining control methods and modern practices, with chapters on fungicides and their formulation and low volume spraying, on soil sterilization, seed dressings, and spraying machinery for field and glasshouse. Other chapters cover the commoner diseases of crops, including mushrooms, and there is a glossary of common and latin names.

Kamat (M. N.). **Handbook of tropical crop diseases.**—84 pp., 3 pl., 18 fig., Poona, Prakash Publishing House, 1958.

A semi-technical publication in which an introductory section deals briefly with general principles and is followed by a tabulated list of 268 diseases, their symptoms, and control. Appendixes cover seed treatment for 19 diseases and spraying programmes for 39.

Isachenko (B. L.). Избранные труды. [Selected works.]—302 pp., 3 pl., 16 fig., 1 graph, Academy of Science Publishers, Moscow–Leningrad, 1957. Roubles 18.83.

This 3rd volume, a collection of (mostly early) biological papers [cf. **16**, p. 398; **23**, p. 210], includes a section on phytopathology (pp. 95–132).

Moniz (L.) & Patel (M. K.). **Three new bacterial diseases of plants from Bombay State.**—*Curr. Sci.*, **27**, 12, pp. 494–495, 1958.

From the College of Agriculture, Poona, descriptions are given of: seedling blight of onion and garlic, caused by *Phytobacterium siccatum* sp. nov., with short rods, $1{\cdot}6 \times 0{\cdot}9\,\mu$, 1–2 polar flagella, circular, shining, butyrous, pearly white colonies on potato dextrose agar, milk neither digested nor peptonized, litmus milk alkaline, NO_3 reduced, no indole, in peptone-free medium acid without gas from most sugars and salicin, thermal death-point 61° C.; leaf spot of *Martynia diandra* caused by *Xanthomonas martinicola* sp. nov.: short rods, $1{\cdot}3 \times 0{\cdot}6\,\mu$ with polar flagellum, circular, smooth, glistening, butyrous, baryta yellow colonies on potato dextrose agar, milk peptonized, NO_3 not reduced, no indole, no growth in salicin, thermal death-point about 52°; leaf spot of *Vitis carnosa* caused by *X. vitis-carnosae* sp. nov. (not pathogenic to vine): short rods, $1{\cdot}6 \times 0{\cdot}8\,\mu$ with polar flagellum, circular, smooth, glistening, butyrous, barium yellow colonies on potato dextrose agar, copious growth on potato cylinders, milk peptonized with clearing, NO_3 not reduced, no indole, no growth in salicin, thermal death-point about 51°.

Huber (J.). **Untersuchungen zur Physiologie insektentötender Pilze.** [Studies on the physiology of fungi lethal to insects.]—*Arch. Mikrobiol.*, **29**, 3, pp. 257–276, 1958.

At the Institut für Allgemeine Botanik, Friedrich-Schiller University, Jena, Germany, *Metarrhizium anisopliae* [**36**, p. 527; **37**, p. 517], *Cordyceps militaris* [**34**, p. 65], *Beauveria bassiana*, and *Aspergillus flavus* were shown to be largely non-specific in their N requirements, making good to very good use of both organic and inorganic sources at pH 3·3–8·5. All these fungi attack a wide range of insects. On the other hand, *Pericystis* [*Ascosphaera*] *apis*, specialized on bees [**35**, p. 45], can utilize only very complex organic N compounds, making little or no growth on inorganic sources, and developing only in acid to neutral media. No connexion could be traced between the assimilation of sugar- and C-containing compounds and parasitic aptitudes. Chitin was hydrolysed by all the fungi except *A. apis*, the sparse growth of which on artificial media precluded observations on its enzymatic activity.

M. anisopliae, *C. militaris*, *B. bassiana*, and *Aspergillus flavus* were unable to develop in fresh garden soil owing to the presence of antibionts (actinomycetes in the case of *B. bassiana* [cf. **36**, p. 261]).

Zerova (Mme M. Y.). **Empusa aulicae Reichardt** — збудник епізоотії Гусені златогузки (**Euproctis chrysorrhoea L.**) на Україні. [*E. aulicae* agent of the epizootic of caterpillars of *E. chrysorrhoea* in Ukraine.]—*J. Bot. Acad. Sci., Ukr.*, **15**, 4, pp. 94–96, 3 fig., 1958. [Russian and English summaries.]

A description of *E. aulicae* which caused mass death of brown tail moth caterpillars in the Cherkassy region in 1958.

Josifović (M.). **Nova stremljenja u hemiskoj zaštiti biljaka od bolesti.** [New efforts in the chemical control of plant diseases.]—*Zasht. Bilja* (*Plant Prot., Beograd*), *1957*, 44, pp. 107–115, 1957. [French summary. Received Feb. 1959.]

A short historical review of fungicides, with reference to the most recent compounds used successfully for plant protection, is followed by a description of the development of the Zorka chemical plant in the past 20 yr. and developments in its production of fungicides, insecticides, and herbicides.

Maceljski (M.) & Kišpatić (J.). **Iskustva sa rasprašivanjem u vlažnim zaprašivanjem.** [Experience with dusting and mist spraying.]—*Zasht. Bilja* (*Plant Prot., Beograd*), *1957*, 44, pp. 99–105, 1 fig., 1 graph, 1957. [German summary. Received Feb. 1959.]

At Lika, Vrhovine region, Yugoslavia, dusting potatoes with dithane Z-78 at 3 kg./ha. against blight (*Phytophthora infestans*), using the Schefenacher AS–1 type of apparatus, then spraying with water (in dry weather) at 200 l./ha., resulted in only 7·5% incidence, compared with 25·3% in the control; yield increased by 32·5%. Using the same brand of machine for spraying vines against *Plasmopara viticola* [**36**, p. 85] a mist spray of cusul, alternative to 1% Bordeaux, resulted in only 0·1% incidence compared with 38% in the control.

Săvulescu (Alice), Bontea (Vera), & Focșăneanu (I.). **Eficacitatea unor preparate organice in combaterea manei la Vita de Vie (Plasmopara viticola (Berk. et Curt.) Berl. et de Toni) și a rapănului la Meri (Endostigme inaequalis (Cooke) Syd.).** [Efficacy of some organic preparations in the control of Vine mildew (*P. viticola*) and Apple scab (*E. inaequalis*).]—*Comun. Acad. Repub. rom.*, **8**, 3, pp. 313–320, 1958. [Russian and French summaries.]

In tests covering 1955–57 at 1 experiment station in Romania and 1 yr. only at several others, home-manufactured (carbadin) and foreign products (fuclasin and zineb-Duphar) based on zineb [cf. **38**, p. 122] at 0·3–0·8% proved more effective against *P. viticola* on Italian Riesling vines than Bordeaux mixture (0·25–0·75%), except for late attacks, against which the latter is superior. The Zn compounds also stimulated growth.

Another local product, merfazin (phenyl mercuric chloride) at 0·2% gave very good control of *E.* [*Venturia*] *inaequalis* [**35**, p. 899] in 1955 and 1956. Unlike Bordeaux it did not cause corkiness of the fruits, especially on Jonathan.

Eckstein (Z.) & Żukowski (E.). **O własnościach grzybobójczych pewnych pochodnych benzoksazolonu.** [The fungicidal properties of some benzoxazolone derivatives.]—*Przem. chem.*, **37**, 6, pp. 418–420, 1958. [Russian and English summaries.]

In further studies at the Warsaw Polytechnic [**38**, p. 58] 6-chloro- and 6-bromobenzoxazolone-2 were particularly active among the compounds tested against

Fusarium culmorum, *Alternaria tenuis*, and *Rhizoctonia* [*Corticium*] *solani*. They are easily prepared by direct chlorination and bromination of benzoxazolone-2.

Ali (M. I.), Ahmed (Q. A.), & Khundkar (M. H.). **Evaluation of fungicidal properties of lignin acetic acid. Part I. Studies on fungus organisms in Petri plates.** —*Pakist. J. sci. industr. Res.*, **1**, 1, pp. 79–84, 1 graph, 1958.

At the Dept of Chemistry, Dacca University, lignin acetic acid, synthesized from the 'black liquor' waste of paper mills, was tested at 0·25–5% in Czapek's medium for toxicity to *Rhizoctonia* sp., *Colletotrichum corchori*, *Macrophomina phaseoli*, *Diplodia corchori* (which may cause up to 60% damage to the jute crop [cf. **37**, p. 723]), and *Memnoniella echinata* (isolated from mildewed cotton) [**35**, p. 314]. The compound effectively controlled the fungi, especially *R.* sp. and *C. corchori*.

Spray nozzles.—*R.R.I. Plant. Bull.* 40, pp. 17–21, 6 fig., 1959.

In this contribution to the present series of papers on spraying machinery [cf. **38**, p. 225], brief, practical notes are given on fan nozzles (suitable for applying spray downwards); solid and hollow cone nozzles, the former still favoured for high-vol. spraying of trees and orchards, the latter for large quantities of spray and in machines operating at high pressure, or where the solution contains suspended matter; jet nozzles, useful where a thin stream with max. throw and min. atomization is required; and airblast nozzles, now used in small, portable power-operated mist blowers.

Rosa (M.). **Contributo ad una bibliografia fitopatologica italiana per l'anno 1957.** [Contribution to an Italian phytopathological bibliography for the year 1957.] *Boll. Staz. Pat. veg., Roma*, Ser. 3, **15**, (*1957*), 2, pp. 351–371, 1958.

A list of 444 publications by 196 authors [cf. **37**, p. 212].

Myuge (S. G.). Взаимодействие фитогельминтов и низших грибов в растениях. [The reciprocal action between nematodes and lower fungi in plants.]— *Zashch. Rast., Moscow* [*Plant Prot., Moscow*], *1959*, 1, pp. 34–35, 1959.

At the Helminthology Laboratory, Academy of Sciences, U.S.S.R., water into which onion stem nematodes [*Anguillulina dipsaci*] had excreted enzymes was injected into onion plants, which were then inoculated with *Botrytis allii* [**38**, p. 51]. All were attacked by collar rot, whereas only 30% of the controls injected with pure water became infected. Similar results were obtained with injected cabbage later inoculated with *B. cinerea*. The author concludes that the importance of nematodes is not so much in transmitting the disease as in creating favourable metabolic conditions in the plant for fungal infection [cf. **33**, p. 377].

Ray (D. L.) & Stuntz (D. E.). **Possible relation between marine fungi and Limnoria attack on submerged wood.**—*Science*, **129**, 3341, pp. 93–94, 1959.

Studies conducted on wood submerged in the sea at Friday Harbour, University of Washington, and Naples, Italy, indicated that the activities of the wood-boring *Limnoria* were not significantly related to marine fungi [cf. **37**, pp. 322, 563], as the occasional mycelium in the wood showed no relation to *L.* burrows, and also *L.* could be maintained in culture in 'unconditioned' and autoclaved wood in the absence of fungi.

Législation phytosanitaire des territoires d'outre mer (Pouvoir Central, Togo, Cameroun, A.O.F., A.E.F., Madagascar, Polynésie française, Nouvelle Calédonie). [Phytosanitary legislation in the overseas territories (Central Authority, Togo, Cameroons, French W. Africa, French Equatorial Africa, Madagascar,

French Polynesia, New Caledonia).]—*Agron. trop., Nogent*, **13**, 6, pp. 761–764, 1958.

Further tables are presented listing the legal documents relating to plant health issued in the various territories of the French Union during 1957 [cf. **37**, p. 452], with dates of publication and a statement of contents, cross-indexes under crops and other headings also being given. The items include decrees forbidding the entry into Togoland and French W. Africa of citrus plants from countries in which tristeza virus is present, and one making the adoption of control practices against Sigatoka disease of bananas [*Mycosphaerella musicola*] in French Guinea compulsory.

Butler (Gillian M.). **The development and behaviour of mycelial strands in Merulius lacrymans (Wulf.) Fr. II. Hyphal behaviour during strand formation.** —*Ann. Bot., Lond.*, N.S., **22**, 86, pp. 219–236, 7 fig., 1958.

In further work [**37**, p. 145] the mode of hyphal branching in *M. lacrymans* was observed in mycelium growing from a wood food base on to glass slides during incubation in sterile moist chambers. A hierarchy of branches and sub-branches arose from the region of clamp connexions, or nodes, of relatively wide main hyphae. Mycelial strands were built up by growth and branching of thigmotropically sensitive 'tendril' hyphae in association with the wide main hyphae. These 'tendril' hyphae, characteristically narrow and thin-walled, arose both as later-formed branches from the nodes of the main hyphae and as the narrowed tips of earlier branches. This branching behaviour was seen amongst aerial hyphae over agar media: hyphae within or in contact with the agar did not form strands.

Robertson (N. F.). **Observations of the effect of water on the hyphal apices of Fusarium oxysporum.**—*Ann. Bot., Lond.*, N.S., **22**, 86, pp. 159–173, 1 fig., 4 graphs, 1958.

At the Botany School, University of Cambridge, it has been found that when colonies of *F. oxysporum* [**36**, p. 51] on mineral-sucrose agar are flooded with the mineral-sucrose solution (without agar), or with solutions of any of the constituents at 0·076 M, the leading hyphal apices at the agar surface grow on unchecked, but with solutions of higher or lower molarity, more of these apices cease growth, and subterminal branching occurs. In distilled water about 50% of the apices swell and then branch, the rest swelling slightly and then growing on within 40 sec., whereas in 0·5 M sucrose more than 90% of the apices branch and there is no swelling. Branching always occurs when the apex is arrested for more than 1 min.

These and other data are interpreted in terms of an irreversible change in the apical cap of the arrested hypha, so that outlets for growth must be found subterminally. Such a mechanism, however triggered, could account for a wide variety of morphogenetic forms in the fungi.

Tolba (M. K.) & Salama (A. M.). **Growth, respiration, and nitrogen metabolism of mycelial mats of Fusarium oxysporum as affected by varying the cation of nitrate salt in culture medium.**—*Proc. Iraqi sci. Soc.*, **1**, pp. 37–38, 1957. [Abs. in *Chem. Abstr.*, **53**, 1, col. 503 i, 1959.]

In studies at the College of Arts and Science, Baghdad, substantial quantities of nitrate N were converted into proteins by mycelial mats of *F. oxysporum*, which took up practically equal amounts from $NaNO_3$, KNO_3, and $Ca(NO_3)_2$ but much less from $Al(NO_3)_3$. The respiration rate of mats suspended in media containing KNO_3 was higher than that of those supplied with $Ca(NO_3)_2$ and lower than with $NaNO_3$ or $Al(NO_3)_3$. The best growth was in media containing Ca, followed by K and Na. It is concluded that Ca is essential for growth and protein synthesis by the mycelium of *F. oxysporum*.

Teitell (L.). **Effects of relative humidity on viability of conidia of Aspergilli.**—*Amer. J. Bot.*, **45**, 10, pp. 748–753, 5 graphs, 1958.

At the Pitt-Dunn Laboratories, Philadelphia, 2 strains of *Aspergillus flavus* and 1 of *A. terreus* were found to be sensitive to a narrow band of R.H. [cf. **28**, p. 28] which had a lethal effect on the conidia. At 29° C. it was 75% R.H. (73 or 77% had a comparatively small effect). One month at 75% R.H. reduced viability to zero, but 6 months at 32 or 85% left 40% viable. Increasing temp. at a given R.H. decreased viability and shifted the lethal R.H. from 75% at 29° to 81% at 45°. Similar though inconclusive effects were noted with *A. niger*.

Grosclaude (C.). **Action de l'acide indole-β-acétique sur la croissance in vitro de quelques champignons : Coryneum beijerinckii Oud., Fusicoccum amygdali Del., Cytospora leucostoma (Pers.) Sacc. et Stereum purpureum.** [Action of indole-β-acetic acid on the growth *in vitro* of some fungi.] —*C. R. Acad. Sci., Paris*, **248**, 5, pp. 737–740, 1 graph, 1959.

The fungi tested are grouped according to their sensitivity, the threshold values for growth on Richards's agar+malt extract (5 g./l.) being *C. beijerinckii* [*Clasterosporium carpophilum*] > 100 mg./l., *F. amygdali* [**36**, p. 411] > 10 mg., and *Cytospora* [*Valsa*] *leucostoma* and *S. purpureum* [**37**, p. 414] > 1 mg.

Vörös (J.). **Fungistatic activity of the species Sphaeropsidales and Melanconiales.**—*Acta microbiol. Acad. Sci. Hung.*, **5**, 3, pp. 261–266, 6 fig., 1 graph, 1958.

At the Budapest Research Institute for Plant Protection, selective culture media containing 100 μg./ml. penicillin, streptomycin, or chloromycetin or 0·4% sodium propionate were used to obtain bacteria-free cultures of 39 spp. (48 Sphaeropsidales and 10 Melanconiales). Their fungistatic activity was then studied on Czapek-Dox and malt agar against *Colletotrichum atramentarium*, *C. linicola*, *Rhizoctonia* [*Corticium*] *solani*, *Sclerotinia sclerotiorum*, *Aspergillus niger*, and *Botrytis allii*. It was found to be significant for *Phomopsis cordifolia* and *Phoma longissima*, weak in *Coniothyrium fuckelii* [*Leptosphaeria coniothyrium*], *Microdiplodia henningsii*, and *Monochaetia viticola*, and absent in the other spp. Surface cultures of the 5 active spp. were tested for the production of the active agent in 3 different liquid media. The highest *Aspergillus niger* titres were obtained with *P. longissima* after 15 days' growth in a semisynthetic liquid medium, but this sp. lost its fungistatic activity in about 6 months in artificial media.

Gäumann (E.). **The mechanisms of fusaric acid injury.**—*Phytopathology*, **48**, 12, pp. 670–686, 9 graphs, 1958. [63 ref.]

A translation of a paper already noticed [**38**, p. 37].

Becker (Z. E.) & Lisina (Mme E. S.). Растения-симбиотрофы и микрофлора их ризосферы. [Symbiotrophic plants and the microflora of their rhizospheres.] —*Bull. Soc. Nat. Moscou*, Sect. Biol. N.S., **63**, 6, pp. 87–94, 1958. [English summary.]

The rhizospheres of plants grown in different soils from 5 regions, from Frunze to Tashkent (middle E. U.S.S.R.), were examined for microbial composition. The numbers of fungi (except *Fusarium*) in the rhizosphere of grasses and of Gram-bacteria for legumes were less than for cruciferous plants (control). This seems to result from the antibiotically active substances formed by the roots of symbiotrophic plants, which create favourable conditions for their symbionts.

Groenewound (van H.). **Humus sterilization by gamma irradiation.**—Abs. in *Proc. Canad. phytopath. Soc.*, **26** (*1958*), p. 12, 1959.

In contrast to ordinary sterilization, sterilization by gamma rays [cf. **38**, p. 189]

produced very small changes in the physical and chemical properties of humus at the Plant Pathology Laboratory, Saskatoon. It was more effective on dry than on moist humus; $2{\cdot}5 \times 10^6$ rads was necessary for complete sterilization of dry humus; this had practically no effect on the action of penicillin, magnamycin, neomycin, erythromycin, or dihydrostreptomycin on *Staphylococcus*. Irradiation did not change the soil pH and only slightly affected the redox potential. This method should be well suited to the study of the antagonism of micro-organisms in natural media.

Shaw (C. G.). **Host fungus index for the Pacific Northwest. I. Hosts. II. Fungi.**—*Sta. Circ. Wash. agric. Exp. Sta.* 335, 127 pp.; 336, 237 pp., 1958. [31 ref.]

In Part I are listed alphabetically all the vascular plants except Gramineae (covered by Sprague and Fischer [**32**, p. 680]), each with the recorded saprophytic and parasitic fungi and States where found. In part II the fungi are listed alphabetically together with a published reference, their commoner synonyms, and list of hosts.

Terrier (C.). **Contribution à l'étude de la flore mycologique du Val d'Herens.** [A contribution to the study of the fungus flora of the Val d'Herens.]—*Bull. Murith.*, **75**, pp. 35–40, 1958.

This is a list of parasitic fungi (5 phycomycetes, 4 ascomycetes, 3 imperfect fungi, and 61 rusts and smuts) collected in Aug. 1957 in Valais, Switzerland [cf. **25**, p. 46].

Vörös (J.). **Adatok Magyarország fungi imperfecti flórájának ismeretéhez.** [A contribution to the flora of imperfect fungi in Hungary.]—*Bot. Közl.*, **47**, 3–4, pp. 277–280, 2 fig., 1958. [English summary.]

Data from a collection of fungi in Hungary, in 1956–7, covering 29 Sphaeropsidales (2 new spp.), 13 Melanconiales, and 11 Hyphomycetes, of which 15, 1, and 4, respectively are new records for the country.

Barkai-Golan (R.). **A study of air-borne fungi in Israel.**—*Bull. Res. Coun. Israel*, Sect. D, **6**, 4, pp. 247–258, 5 graphs, 1958. [16 ref.]

Czapek agar plates were exposed for 15 min. every 2nd day during 3 successive yr. (June 1950–June 1953) in Tel Aviv and during 1 yr. at 5 other places in Israel, and examined at the Hebrew University, Rehovot. During the winter there were fewer spores in the air. Most frequently found in the various localities were *Hormodendrum* (35–65% of the total), *Alternaria* (6–11%), *Penicillium* (5–14%), *Aspergillus* (2·5–9%), miscellaneous fungi (13–29%), and Actinomycetes (about 8%).

Collections from an aeroplane indicated that up to 300 m. large numbers of fungi were present, greatly decreasing towards 1,000 m., above which spores occurred only rarely. Spores were collected over the Mediterranean Sea [cf. **38**, p. 182] at various distances from shore, the spp. present being identical with those found over land. No area was found to be entirely free from air-borne spores.

Kenneth (R.). **Contribution to the knowledge of the Helminthosporium flora on Gramineae in Israel.**—*Bull. Res. Coun. Israel*, Sect. D, **6**, 4, pp. 191–210, 12 fig., 1958. [23 ref.]

Disease symptoms caused by and morphological features of 9 *H.* spp. are described from the Hebrew University, Rehovot, including *H.* (*Pyrenophora*) *avenae* on wild and cultivated oats, *H. maydis* (*Cochliobolus heterostrophus*) [map 346] on maize, *H. rostratum* on Sudan grass, *H. sacchari* [map 349] on *Cymbopogon citratus*, *H. sorghicola* on Sudan grass and *Sorghum halepense*, *H. tritici-vulgaris* on durum wheat, and *H. turcicum* on Sudan grass, sorghum, *S. halepense*, and maize. *H. turcicum* is both widespread and catastrophic on Sudan grass and severe on maize,

whereas the disease caused by *C. heterostrophus* on maize, though very destructive, was found only once. A key is given for the spp. described and for 3 others known in Israel, *H. gramineum*, *H.* (*Pyrenophora*) *teres*, and *H. sativum* [*Cochliobolus sativus*: map 322].

Cummins (G. B.) & Ramachar (P.). **The genus Physopella (Uredinales) replaces Angiopsora.**—*Mycologia*, **50**, 5, pp. 741–744, 1958.

After pointing out that there would appear to be no taxonomic basis for maintaining *Physopella* and *Angiopsora* as distinct genera and that the latter must be reduced to synonymy, the authors, in order to correct the nomenclature, list 18 proposed new combinations, including *P. ampelopsidis* (syn. *A. ampelopsidis* and *Phakopsora vitis*) [cf. **36**, p. 518] on vine and *Physopella zeae* (*A. zeae*) [on maize].

Scheinpflug (H.). **Untersuchungen über die Gattung Didymosphaeria Fuck. und einige verwandte Gattungen.** [Studies on the genus *Didymosphaeria* and several related genera.]—*Ber. Schweiz. bot. Ges.*, **68**, pp. 325–385, 21 fig., 1958.

This monograph from the Institut für spezielle Botanik, Zürich, begins with an historical review of the genus and its systematic position. Because some species can form their fruit-bodies inside those of other ascomycetes the synonyms *Cryptodidymosphaeria*, *Phaeodothis*, and *Didymascina* have been used. The author considers that the genus should remain in the Pleosporaceae.

In the detailed section 18 spp. (2 new) are described, in 4 groups, and a key is provided.

Tinline (R. D.) & Dickson (J. G.). **Cochliobolus sativus. I. Perithecial development and the inheritance of spore color and mating type.**—*Mycologia*, **50**, 5, pp. 697–706, 5 fig., 1958.

In further studies at the Botany and Plant Pathology Division, Dept of Agric., Ottawa [**31**, p. 178], and the Dept of Plant Pathology, University of Wisconsin, Madison, perithecia of *C. sativus* failed to develop on media from which plant parts, such as cereal grains, were excluded. Agar media served only as sources of moisture and as buffers to maintain a pH conducive to perithecial formation. The maintenance of cultures at 24° C. for 7 days and then at 20° for 14 days on media of pH 4–6 favoured the development of mature perithecia, which formed under all conditions of light, though sunlight appeared to inhibit the delimitation of ascospores. Random-spore analysis for conidial colour (white and olivaceous) and mating type (*A* and *a*) [**35**, p. 288] indicated that the characters were not linked.

Heim (Panca). **Sur la reproduction sexuelle du Cystopus portulacae DC.** [On the sexual reproduction of *C. portulacae*.]—*C. R. Acad. Sci., Paris*, **248**, 7, pp. 1012–1014, 1959.

A recent study of abundant material of *C.* [*Albugo*] *portulacae* from the leaves of *Portulaca oleracea* made possible the elucidation of the nuclear phenomena in this and other *A.* spp. and the Peronosporaceae. The ripe oospore is binucleate and becomes multinucleate at germination, following repeated mitoses of its 2 nuclei.

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Raper (J. R.) & Krongelb (Gladys S.). **Genetic and environmental aspects of fruiting in Schizophyllum commune Fr.**—*Mycologia*, **50**, 5, pp. 707–740, 1 pl., 1 graph, 1 map, 1958. [39 ref.]

The results are presented of an investigation of a large, world-wide sample of the fungus carried out at Harvard University, including a study of the genetic control of fruiting with particular regard to the genetics of the ability to produce fruiting bodies, the inheritance of various abnormalities in them, and the extent to which

the inherited pattern of fruiting may be affected by environmental conditions. Genetic background is the most critical factor in determining the occurrence and time of fruiting. Using 116 homokaryotic mycelia, cross-mated in all combinations, fruiting occurred in 80% of the resulting 6,546 dikaryons. Fruiting ability is inherited as a quantitative character.

Five fruiting abnormalities, which are described, each genetically determined, are characterized as 'cauliflower', 'medusoid', 'bug's ear', 'coralloid', and haploid (homokaryotic) fruiting, the last being a quantitatively inherited character distinct from dikaryotic fruiting ability.

The effects of light, nutrient, and other environmental factors were again confirmed, but no restoration to normal fruiting in genetically inadequate stocks was obtained through changes in external factors.

Fischer (C. B.). **An improved Petri dish.**—*J. med. Lab. Tech.*, **15**, 4, pp. 282–284, 2 diag., 1958.

At the Roussel Laboratories Ltd., 845, Harrow Road, London, N.W. 10, modifications in design were made with a view to reducing the high breakage rate caused by dishes sliding off a lower one in carriage round the laboratory and condensation water causing the bottom of one dish to adhere to the lid of another. In the improved model each dish articulates with the one above and below when stacked. In a 4-in. dish there is a depression in the lid $3\frac{1}{8}$ in. diam. and $\frac{1}{8}$ in. in depth, into which fits an annulus of glass on the bottom of the dish above 3 in. diam. $\times \frac{1}{8}$ in. sq. cross section. Dishes of this design can be manufactured by Chance Bros. Ltd., in periflint glass at a max. of 4*s*. 6*d*. each retail.

Cappellini (R. A.) & Haenseler (C. M.). **Longevity of some graminicolous species of Helminthosporium under mineral oil.**—*Phytopathology*, **48**, 12, pp. 695–696, 1958.

A note on the maintenance of cultures of 32 *H.* spp. on Difco potato dextrose agar under mineral oil [cf. **35**, p. 565] at Rutgers University, New Brunswick, New Jersey. At the end of 7 yr. 16 were recovered within 5–10 days of transfer; the remainder showed no growth after 1 month. Of those recovered, 3 spp. were apparently unable to sporulate.

Smith (K. M.) & Lauffer (M. A.). (Editors.) **Advances in virus research. Volume VI.**—viii+382 pp., 21 fig., 1 graph, New York, Academic Press Inc., London, Academic Books Ltd., 1959. $10.00.

This volume [cf. **37**, p. 340] includes contributions covering the purification of plant viruses (R. L. Steere, pp. 3–70), the biochemistry of plant virus infection (C. A. Porter, pp. 75–89), the spread of plant viruses (L. Broadbent & C. Martini, pp. 94–130), and physiological aspects of bacteriophage genetics (S. Brenner, pp. 137–157). All are of interest to plant pathologists.

Blattný (C.). **Beispiele der Anwendung virologischer Erkenntnisse bei den Pflanzenschutzoperationen.** [Examples of the application of virological knowledge to plant protection operations.]—*Wiss. Z. Friedrich Schiller Univ.*, **7** (*1957–8*), pp. 453–454, 1958.

This lecture on the occasion of the 400th anniversary of the Schiller University, Jena, is concerned principally with the control of potato and hop viroses in Czechoslovakia. A conservative estimate of 6 yr. ago puts the losses from plant virus diseases in that country at 9·3% of the harvest.

Sommereyns (G.). **La chromatographie et l'électrophorèse appliquées à l'étude biochimique des virus végétaux.** [Chromatography and electrophoresis applied

to the biochemical study of plant viruses.]—*Ann. Gembl., 1958*, pp. 311–333, 1958. [142 ref.]

The author reviews and discusses the available information on this subject under the headings: chromatography, principles and methods, chromatography by adsorption, by ion exchange, by separation of amino acids, and paper chromatography; electrophoresis, principles and methods, free electrophoresis, and zonal electrophoresis. The latter part of the paper deals with the application of these methods to plant virology, including the detection and identification of viruses in infected plants.

Atti del primo Convegno sulle malattie da virus dei fruttiferi e della Vite, Pavia, 7–8 Giugno 1958. [Proceedings of the 1st Convention on virus diseases of fruit trees and the Vine, Pavia, 7–8 June 1958.] —*Notiz. Malatt. Piante, 1959*, 47–48 (N.S. 26–27), pp. 1–242, 48 pl., 3 fig., 1959. [Numerous English summaries.]

The 1st part of these Proceedings (pp. 5–104) contains a short account of the activities of the Convention and the introductory addresses. R. Ciferri (pp. 17–28) gave an introduction to research on virus diseases of fruit trees, discussing the situation in regard to the position in Italy and listing the 28 virus and 7 virus-like diseases at present under study at the University of Pavia, with notes on the experimental plantings of fruit trees at Pavia and Voghera. E. Baldacci (pp. 29–37) dealt with virus diseases and the genetic improvement of the vine, with special reference to infectious degeneration of grafted Italian vines [**37**, p. 569, *et passim*]. N. Breviglieri (pp. 38–52) discussed clonal and sanitary selection of propagating material for vines and fruit trees for the improvement of yields. G. Goidanich, A. Canova, and E. C. Branzanti (pp. 53–66) described the activities of the Institute of Plant Pathology of the University of Bologna in the study of virus diseases of fruit trees. G. Perusini (pp. 67–74) recounted the work done in 1957 by the Udine Provincial Association for Viticulture and Œnology, with special reference to the eradication of infectious degeneration of the vine locally. Finally, F. Scaramuzzi (pp. 75–102) read a paper (71 ref.) on the relations between virus diseases of fruit trees and stock-scion incompatibility.

The 2nd part consists of papers read. F. Bertossi (pp. 105–109) described the *in vitro* culture of viruses in plant tissues [cf. **37**, p. 507]. A. Canova (Bologna University) described (pp. 110–115) 2 new virus syndromes for Italy, 1 on peach resembling tatter leaf virus of cherry [peach ring spot virus], the other, on 15–20 yr.-old 'durone' cherry trees, referred to as 'infective a-sclerosis', in which 1–3 yr.-old branches tended to grow horizontally. This symptom was reproduced by grafting, the young branches on the grafted trees hanging downwards. The first record from Europe of a condition referred to by the authors as 'peach yellow mosaic virus disease', which resembled peach calico virus disease [cf. **36**, p. 534], was made by A. Canova and E. C. Branzanti (pp. 116–117). A. Corte (pp. 118–121) reported the presence of stony pit virus [cf. **37**, p. 487] on Kaiser Alexandre pears near Bolzano in Sept. 1958 and described the distribution and spread of the disease locally.

A. Corte and G. Scaramuzzi (Pavia) described (pp. 122–139) experiments on the transmission of apple mosaic virus [cf. **36**, p. 703, *et passim*]. The most susceptible var. tested was Golden Delicious, followed by Belle of Boskoop, Lord Lambourne, Imperatore, Abbondanza, and Gravenstein. All 3 strains of the virus appeared to be present. The virus was transmitted by chip-budding to Hale peach, Shiro plum, and to Myrobolan seedlings with the production of line-pattern symptoms; the evidence indicated that plum line pattern and apple mosaic viruses are strains of one virus [cf. **36**, p. 705]. The virus was also transmitted to Beurré Hardy pears and to quince seedlings, the leaf symptoms on which are described.

A. Graniti (Bari) described (pp. 140–143) a vine disorder observed near Foggia,

southern Italy, in the spring of 1958, resembling enation disease in California [cf. **34**, p. 344]. F. Gualaccini (pp. 145–154) dealt with researches on a disease of apricot trees in the province of Modena apparently identical with the mosaic virus disease of apricots prevalent in the Campania and with 'mosaic' or 'line-pattern' virus disease of almond [cf. **36**, pp. 412, 476]. F. Gualaccini (pp. 155–161) gave a preliminary account of an apparently new disease of European chestnut, observed in the province of Siena in 1957. The leaves bore 'line pattern', 'oak leaf', or round or irregular spots, or pale green or yellowish flecking; the 1st results of grafting experiments appeared to be positive.

A. Kovacs and A. Canova (pp. 163–165) described preliminary experiments on the use of paper chromatography for the rapid demonstration of the presence of virus infections in fruit trees. A. Mezzetti (Bologna) (pp. 166–169) discussed the yellowing or premature leaf fall of persimmon in Italy [**36**, p. 335], attempts at the transmission of which are still in progress. G. Morvan (Centre National de la Recherche Agronomique, Versailles) presented (in French, pp. 170–172) the results of experiments on the transmission of the apricot wilt disease present near Lyons [cf. **37**, p. 292]; chip-budding of apricot seedlings in the glasshouse reproduced the symptoms in 1 yr. G. C. Pratella (Bologna) reported observations (pp. 173–177) on the epidemiology and etiology of silver leaf on peach, one form of which may be due to a virus [cf. **33**, p. 733].

M. Ribaldi (Perugia) made a preliminary report (pp. 178–181) on a new virus disease of olive, observed in Perugia in 1956, and referred to as 'infective yellows', from the chief symptom. A few graft transmissions to the wild olive (*Olea europaea* var. *oleaster*) have been obtained. G. Scaramuzzi, A. Corte, and R. Carlone (Pavia and Turin) gave an account (pp. 182–192) of experiments on the transmission of apple rubbery wood virus [cf. **35**, p. 775], stated to be prevalent in the province of Cuneo on Golden Delicious on Dolcino stock. G. Scaramuzzi, E. Refatti, and A. Corte (pp. 193–218) reported studies at Pavia on witches' broom virus disease of apples [cf. loc. cit.] with special reference to the symptoms on different vars. C. Vidano (Centro di Entomologia alpina) discussed (pp. 219–226) possible relations between some Typhlocybid Hemiptera and infectious degeneration of the vine [see above].

In an appendix I. Cosmo and G. Pieri (Stazione Sperimentale di Viticoltura et di Enologia, Conegliano Veneto) described (pp. 229–230) 2 tests of the effects 4 organic products against downy mildew [*Plasmopara viticola*] in preventing premature defoliation of vines [cf. **38**, p. 122], G. P. Martelli, M. Salerno, and A. Ciccarone (pp. 231–237) discussed the results of spraying tests carried out in spring in Sicily with zineb, zineb+glycerin, captan, and orthocide against shot hole of almonds caused by *Coryneum beijerinckii* [*Clasterosporium carpophilum*: cf. **38**, p. 123] and *Cercospora circumscissa* [cf. **37**, p. 414]. All the treatments significantly reduced leaf spotting. Captan and glycerin damaged the trees. On p. 238 R. Ciferri briefly reviews J. C. Scurti's recent handbook on plant diseases [**38**, p. 300].

Annual Report of the West African Cocoa Research Institute, 1957–58.—79 pp., 1 pl., 4 graphs, 1 plan, 1959. 5*s*.

Virus research and investigations on black pod (*Phytophthora palmivora*) at Tafo Station, Ghana, are dealt with on pp. 22–30 of this report [cf. **37**, p. 463; **38**, p. 315].

A. Attafuah & A. A. F. Brunt succeeded in infecting *Sida linifolia*, an indigenous malvaceous plant, with the Kpeve virus isolate, but not with the New Juaben strain. Observations on a variety of hosts revealed that virus is not continuously available to mealybugs: back tests from plants of *Cola chlamydantha* and *Hildegardia barteri* infected with an isolate from Offa Igbo were positive for 30 months, and then negative until the plants were coppiced, when mealybugs

were again able to acquire the virus. In *H. barteri* infected with the Kpeve isolate, however, back tests were positive until coppicing, since when they have been negative.

In a 40-acre block containing 40,000 Amelonado trees, where for some years monthly inspections and removal of trees with swollen shoot symptoms had been carried out, J. W. Blencowe reports that of 63 diseased trees and 158 'contacts' coppiced to 6 in. since 1957, 48 and 33, respectively, had produced symptom-bearing shoots, as had 66 of 486 coppiced trees presumed to be healthy; this indicates the high level of masked infection and emphasizes the difficulty of eradication even when skilled examinations are carried out frequently.

Reporting further work on the interrelationships of the various isolates, A. Attafuah states that the name 'swollen shoot virus' should be reserved for that group at present including most isolates, which induce swellings of the stem or root. The Kpeve virus, which does not, is typical of a 2nd group which may be given the name 'cacao mottle leaf virus' [cf. **27**, p. 178]. The virus from Asalu, Nigeria [cf. **37**, p. 464 and below], of which the vector is unknown, does not fall into either group.

J. W. Blencowe & A. Attafuah report that with mealybugs [*Pseudococcus* spp.] as vectors it is more difficult to infect Amazon-type cacao than W. African Amelonado. When cuttings from uninfected 'twins' of seedlings, which had shown a variety of symptoms when infected, were bombarded with viruliferous mealybugs there was no correlation between the symptoms on the seedlings and on the cuttings. This inconsistency in the response of clonal material to a standard infection is possibly due to the standard isolate of the New Juaben virus used being a complex of related strains.

A. L. Wharton has extended the scope of experiments on the effect of age and pod size on susceptibility to black pod in order to obtain basic information on seasonal outbreaks. From the 1956 records it was seen that setting occurred mainly at the end of Feb., over the period Apr.–May, and during June–July. The greatest number of fruits set in any 1 week was in Apr. and June. In addition to the young pods lost from cherelle wilt, a number of very young ones are shed, with the stalks attached, during the 1st week after setting; thus, it seems advisable to use the separate names 'cherelle wilt' and 'fruit fall' for these conditions. Cherelles (0–13 week fruits) were most numerous at the end of June, immature pods (from 13 weeks) in mid-Aug., and ripe pods in Oct. Comparison of monthly records of black pod incidence revealed a similar distribution in 1956 and 1957 with peaks in July and Oct., though incidence was 50% greater in 1957; more accurate records in 1957 showed that proximal infections arising from systemic infection of the flower cushion increased gradually to a max. in Oct. It therefore seems unlikely that systemic infections are an important perennial source of black pod infection, and the 2 major epiphytotics recorded during the year were probably initiated by spore transmitted infections. Isolates so far obtained from sources in Ghana have been very similar in appearance and growth rates, both in culture and in pods.

A block of 4-week-old T 82 Amazon seedlings was found to be severely affected by 'die-back' [**37**, p. 220] in mid-Dec.; a *Phytophthora* sp. sporulated freely on affected material kept in humid chambers. No pathogens were isolated from 'leafless twig' disease in the British Cameroons [see below; cf. **36**, p. 638] or from seedlings or chupons showing 'paint-brush' symptoms before jorquetting.

A tip necrosis of flush leaves, common on mature cacao at Tombel, Cameroons, does not appear to be due to a nutritional deficiency; the wet rot of the tip advances most rapidly along the main and secondary veins, the area in advance of the rot being translucent and colourless. A *Colletotrichum* sp. was invariably isolated from the necrotic areas. *P. palmivora* was seen on and collected from the surface of affected tissue, though never present alone: this is the 1st record for W. Africa of

its natural occurrence on leaves of mature cacao. Symptoms of tip necrosis were produced on healthy flush leaves by spraying with a mixed suspension of spores of *C.* sp. and *P. palmivora*, so that one or both may be responsible for the condition.

Research at the Ibadan sub-station on viruses and 'die-back', and observations on the 'chlorosis', 'leafless twig', and 'paint brush' diseases of cacao in the British Cameroons are described on pp. 66–74. T. W. Tinsley & J. M. Thresh have begun investigations on whether the considerable difference in virulence between virus isolates from different trees in a limited area is due to instability of the virus or to mealybugs carrying more than one form of virus from outside sources of infection when starting new outbreaks. Further results from coppicing experiments on naturally occurring outbreaks of swollen shoot confirm earlier conclusions. The number of infected stumps occurring round the treated outbreaks decreased sharply with increasing distance from the infected trees cut out at the time of coppicing, indicating that movement of mealybugs is responsible for most of the spread. Of infected stumps within 30 yd. of such trees, 51% were within 5 yd., 35% between 5 and 10, 8% between 10 and 15, and 6% between 15 and 30 yd. The finding of 0·4% infection in trees 25–30 yd. away indicates that a significant level of spread may occur over considerably greater distances. The 'cacao necrosis virus' from Asalu [see above] has so far not been transmitted experimentally by mealy bugs: experiments are being extended to include other possible insect vectors.

D. Kay has started experiments to demonstrate the effect of the 'die-back' fungus *Fusarium decemcellulare* [*Calonectria rigidiuscula*] on the regeneration of coppiced trees. Comparisons of the rate of increase of existing areas of 'die-back' under different spray programmes for the control of [unspecified] capsids have already been noticed [**38**, p. 315]. In the majority of longitudinal sections through wood affected by 'die-back' there was an outer zone of greyish dead wood yielding several fungi (including *Botryodiplodia theobromae*) [cf. **36**, p. 10], a claret-coloured, narrow middle zone, blackening on exposure, and a narrow water-soaked zone alongside the healthy wood where fungi were apparently absent. Occasionally these well-defined zones did not exist, but where they did *C. rigidiuscula* was usually isolated from the claret zone, and *B. theobromae* from the same zone when there was no water-soaked zone. In some cases there was no clear demarcation between the dead wood and the adjacent, probably moribund, tissue, which extended up to 12 in. below the dead wood and had an overall diffuse black appearance; although no water-soaked zone was visible *C. rigidiuscula* was usually isolated from the latter areas. Irrigation has had no effect on the rate of increase of existing areas of die-back, and has only slightly reduced the initiation of the disease. In an experiment started in Jan. 1958, pruning of dead wood and high-vol. fungicidal spraying with a 3% solution of a Hg-synergised Cu preparation reduced the av. number of *C. rigidiuscula* lesions in Feb. and Mar. to 3·5 and 3·8, compared with 8·6 and 7·8 in untreated and 9·1 and 5·3 in trees which were pruned only: for Cu spraying with pruning the numbers were 7·7 and 2·4. In a series of experiments to investigate the effect of various environmental conditions on the growth rate of *C. rigidiuscula* in 12–18-month-old Amelonado seedlings the av. length of necrotic tissue in lesions following inoculation was consistently greater in the controls (sterile inoculation); on the latter inadequate water, no defoliation, and shade had little effect, though these factors resulted in an increase of infection in the fungal inoculated. Of the sterile inoculations, 96% later became infected, 39% by *Pestalotia* sp., 39% by *B. theobromae*, 18% by various other fungi, and only 1 by *C. rigidiuscula*.

In an experiment by C. K. H. Martini in the British Cameroons 6 seedlings grafted with patches taken from trees showing 'chlorosis' developed no symptoms in the 2 flushes following in the 2 month experimental period [cf. **37**, p. 151]. 'Leafless twigs' [see above], common on old cacao in the Cameroons, began flushing in early Nov., and most trees looked healthy by early Dec. The leaves are usually

lost between Jan. and the beginning of the rainy season, but very few of the twigs die. 'Die-back', where it occurred, was usually associated with capsid damage. As trees under shade usually have good canopies, and there was no evidence to indicate that 'leafless twig' is caused by a parasite, it seems possible that the condition may be associated with lack of shade.

'Paint brush' [symptoms not described] is a condition in the British Cameroons usually associated with seedlings up to 3 yr. old, but it occurs also on chupons of old trees and on buds and branches of dying trees. Several hundred seedlings in 4 plantations were examined at regular intervals from mid-Oct. to early Dec., during which time the percentage showing the symptoms decreased from about 75 to 5 or less, and almost all the seedlings which had shown the symptoms had flushed at least once by early Dec. Attempts to isolate a pathogen have been unsuccessful, nor has it been possible to reproduce the symptoms by grafts from affected to symptomless seedlings. The condition occurs equally in unsprayed and regularly sprayed plantations, and does not appear to be associated with insect attack. Spraying with borax (2·5%) and applications of NPK had no effect. Amazon vars. suffer less than the local Trinitario vars.; poor seedlings or those damaged at planting are more susceptible.

Thresh (J. M.). **The control of Cacao swollen shoot disease in Nigeria.**—*Trop. Agriculture, Trin.*, **36**, 1, pp. 35–44, 2 graphs, 1959.

The general situation in the areas of mass infection is reviewed in the light of information mostly noticed already [cf. **38**, p. 75]. The abandonment of eradication measures in these areas has resulted in their constituting dangerous sources of infection. The rehabilitation of cacao within them is now being undertaken largely in blocks from which sources of infection have been removed as far as possible and which are regularly inspected.

Discovery of new outbreaks presents many practical difficulties, which are outlined, and the annual cost of the inspection service is £170,000. The preparation of more detailed maps will facilitate this operation. Eradication measures practised in the past are outlined, cutting out only the infected trees having been practised until 1950, when a radius of 30 yd. around these began to be cleared. This radius is now being considerably reduced in most instances [**37**, p. 465].

Sharp (E. L.) & Emge (R. G.). **A 'tissue transplant' technique for obtaining abundant sporulation of races of Puccinia graminis var. tritici on resistant varieties.**—*Phytopathology*, **48**, 12, pp. 696–697, 1 fig., 1958.

This technique, devised at Fort Detrick, Frederick, Maryland, is here described in detail [**36**, p. 390].

Chelo (B.). Испытание некоторых устойчивых к бурой ржавчине сортов озимой Пшеницы Албании. [Tests with winter Wheat varieties resistant to brown rust in Albania.]—*Zashch. Rast., Moscow* [*Plant Prot., Moscow*], *1959*, 1, pp. 51–52, 1959.

In 1956–7 in Korchy, Albania, the Bulgarian hybrid wheats Erythrospermum 1616 IZR, 23 IZR, 134 IZR, 521 IZR, and Grecum 408 IZR were all free from infection by brown rust (*Puccinia triticina*) except the 1st 2, which became infected at the end of the milk stage. A susceptible var. had 55% infection. The resistant Italian var. Funo, San-Pastorale, and Mara proved very susceptible in Albania. Bulgarian vars. are recommended for Outer Caucasus republics, which have similar climatic conditions to Albania.

Kobel (F.). **Die Gelbrostepidemie 1958.** [The 1958 yellow rust epidemic.]—*Mitt. schweiz. Landw.*, **6**, 9, pp. 140–142, 1958.

Observations at the Eidgenössische Landwirtschaftlische Versuchsanstalt, Zürich-

Oerlikon, indicated that the epidemic of wheat yellow rust [*Puccinia glumarum*] in Switzerland [**36**, p. 5], considerably more intense than in the previous year, was initiated from volunteer wheat in the preceding autumn. This source is also dangerous in respect of brown rust [*P. triticina*] and [unspecified] foot rots.

General recommendations include deep ploughing (approx. 20 cm.) and twice working over the stubble with a cultivator or disc harrow (min. interval 14 days).

Miladinović (N.) & Spasić (M.). **Pojava Ustilago tritici (Pers.) Jens. u veze sa različitim rokovima setve sorata ozime Pšenice.** [The appearance of *U. tritici* with reference to various sowing terms of winter Wheat.]—*Zasht. Bilja* (*Plant Prot., Beograd*), *1957*, 44, pp. 63–67, 2 graphs, 1957. [English summary. Received Feb. 1959.]

In tests at the Agricultural Research Institute, Zaječar, Yugoslavia, when seed of Rumunska Crvenka wheat was sown in Oct. even under opt. conditions infection by *U. tritici* [*U. nuda*: **34**, p. 586] was greatest, whereas it was much less when sowing was under less favourable conditions in Nov. and Dec. Thatcher is recommended as a parent in breeding for resistance.

Treggi (G.). **Azione in vitro di alcuni composti anticrittogamici sulla germinazione dei clamidoconidi di alcune carie del Frumento.** [The action *in vitro* of certain fungicidal compounds on the germination of the chlamydospores of some Wheat bunts.]—*Ann. Sper. agr.*, N.S., **12**, 5, pp. 1401–1409, 1 fig., 9 graphs, 1 diag., 1958. [English summary.]

At the Osservatorio per le Malattie delle Piante, Pisa, Caffaro powder, copper Sandoz, uspulum Bayer, sesan Caffaro, orthocide 83, and dithane Z-78 were all equally effective in inhibiting spore germination in *Tilletia foetida*, *T. tritici* [*T. caries*], and *T. triticoides* [cf. **27**, p. 415]. The last did not differ appreciably from the other 2 spp. in its sensitivity to the fungicides, which did not appreciably affect germination, but sesan Caffaro sometimes retarded seedling growth. The view that seed from machine-threshed plants is more sensitive to fungicide damage was confirmed.

Jovićević (B.). **Otpornost nekih sorata Pšenice prema glavnici.** [Resistance of some Wheat varieties to bunt.] —*Zasht. Bilja* (*Plant Prot., Beograd*), *1957*, 44, pp. 83–88, 1 graph, 1957. [English summary. Received Feb. 1959.]

Investigations by the Agricultural Research Institute, Peć, Yugoslavia, in 1952–55 on the incidence of *Tilletia levis* [*T. foetida*: **35**, p. 91] in the Kosovo-Metohija region, where it often causes up to 30% infection, showed a local var. to be more resistant (10–12% infection) than 7 others tested. The most susceptible were Frassineto and 2 Kruševač vars.

Rusakov (L. F.). Карликовая головня Пшеницы. [Dwarf bunt of Wheat.]—*Zashch. Rast., Moscow* [*Plant Prot., Moscow*], *1959*, 1, pp. 48–51, 1 fig., 1959.

In the Stavropol' region in 1957 *Tilletia contraversa* on wheat [map 297] was recorded for the 1st time [**37**, p. 765]. Novoukrainka 83 was severely attacked with 54% loss. This is an historical review of dwarf bunt with numerous refs. to the foreign literature. Winter wheat 1553 is very resistant. Disinfection of seeds and soil, rotation with at least 4–5 yr. between wheat crops, and quarantine measures are recommended.

Hansen (F.). **Anatomische Untersuchungen über Eindringen und Ausbreitung von Tilletia-Arten in Getreidepflanzen in Abhängigkeit vom Entwicklungszustand der Wirtspflanze.** [Anatomical studies on the penetration and spread of *Tilletia* spp. in cereal plants in relation to the state of development of the

host plant.]—*Phytopath. Z.*, **34**, 2, pp. 169–208, 19 fig., 1958. [English summary.]

In studies at the Institut für Getreide-, Ölfrucht- und Futterpflanzenkrankheiten, Kiel-Kitzeberg, Germany, the development of *Tilletia* spp. was followed from inoculation [**35**, p. 436] to spore formation. Staining methods used were Popp's cotton blue [**30**, p. 461] and Woolman's Gram staining [**10**, p. 18].

In unwounded seedlings germinating sporidia penetrate the outermost layers of the coleoptile intracellularly and then spread intercellularly. In dwarf bunt (*T. contraversa*) of winter wheat [**32**, p. 240] and rye bunt (*T. secalis*) [**36**, p. 236] very few hyphae have reached the growing point by 50 days. The majority do not spread beyond the coleoptile but under favourable circumstances can cause infection of the tillers. The mycelium of wheat bunt (*T. caries*) reaches the growing point in about 30% of the plants after the same time. In wounded seedlings inoculated with sporidia the course of all 3 bunts is similar. The hyphae grow chiefly through the interstitial spaces, reaching the meristematic tissues of the axis at the base of the leaves. After 30 days mycelium can be found in the growing point in about half the plants.

T. contraversa and *T. secalis* spread in the host only at low temp. (3° C.) and are inhibited at 15°. *T. caries* can attack the host and spread in it at both high and low temp. and at 15° hyphae are present in the growing points of about 50% of unwounded plants after 50 days. The mycelium of *T. contraversa* is able to penetrate wounded seedlings of resistant (Wasatsch winter) wheat and rye (Petkus winter), but is unable to spread further. Anatomical investigations have not revealed the reasons for this. With the further development of the host, bunt mycelium penetrates the cell layers of the ear primordium and with the differentiation of the spikelets penetrates into all floral parts. In mature plants hyphae are to be found only sporadically in the nodes and leaves.

Spores are formed terminally on the hyphae and are at first colourless and smooth with a simple membrane, inside which the wall with its typical markings is laid down. In the mature sorus about 8% of the spores are hyaline; the brown spores may have a simple or a double wall. The formation of the full smut ball takes place between the integuments and in the nucellus. The destruction of the seed primordium proceeds from these 3 zones. In partial infection fungus mycelium occurs only in the ovary wall, fertilization takes place, and the embryo, endosperm, and testa develop. The hyphae are so closely appressed to the cell wall that they cannot be detected without staining. No alteration of the host tissue by the parasite has been detected except in the ovaries.

Sallans (B. J.). **The degree of stunting of Wheat by Helminthosporium sativum in relation to recovery.**—Abs. in *Proc. Canad. phytopath. Soc.*, **26** (*1958*), p. 15, 1959.

At the Canada Dept Agric., Saskatoon, Saskatchewan, it was observed that wheat plants severely stunted in the early seedling stages after inoculation of the seed with *H. sativum* [*Cochliobolus sativus*: **37**, p. 715] may recover under favourable conditions and finally have significantly more and larger leaves and give a better yield than uninoculated plants, recovery being inversely proportional to the initial degree of stunting. Recovery was not dependent on differential root development, since roots as well as stems are stunted by the pathogen.

Kataeva (Mme O. E.). О корневой гнили озимой Пшеницы. [Concerning root rot in winter Wheat.] –*Zashch. Rast., Moscow* [*Plant Prot., Moscow*], *1959*, 1, pp. 35–36, 1 fig., 1959.

A rapid spread of root rot (*Ophiobolus graminis*) [**35**, p. 599] in N. Osetin, U.S.S.R., resulted from 2–3 successive sowings of winter wheat and inadequate ploughing between the crops. Zemka was mown in its green state in many districts in 1956,

when the disease was epiphytotic. In a field previously sown with maize, hemp, and potatoes incidence was much lower. Dusting the grain with granosan [**38**, p. 253] is recommended, as well as deep ploughing and soil disinfection.

Roth (G.). **Einfluß der Quecksilber-Beizung auf Keimung und Jugendwachstum der Gerste unter besonderer Berücksichtigung ihrer selektiven Wirkung auf die samenbegleitende Mikroflora.** [The influence of mercury dusting on the germination and early growth of Barley with particular regard to selective action on the seed microflora.]—*Phytopath. Z.*, **34**, 2, pp. 137–168, 7 fig., 1958. [English summary.]

At the Institut für Pflanzenschutz, Hohenheim, Germany, the Hg-containing dusts abavit, ceresan, germisan [**38**, p. 319], dynamal, and cerenox all at first had an inhibitory effect on germination and early growth of Haisa II barley [cf. **11**, p. 169] on all media. After 10–14 days there was a complete change, the dusted plants grew stronger and appeared significantly more vigorous, except on filter paper. On healthy grain in all 8 barley samples (from different places) used there was a luxuriant micro-flora from which 467 bacteria (45 'forms'), 150 actinomycetes, 47 fungi, and 12 yeasts were isolated; 31 fungi (moulds) were determined to spp. and their incidence is recorded. Only 3 spp. of bacteria (*Pseudomonas*) had a harmful effect on germination and early growth with light inoculation. Injuries were more severe on sterilized seed and increased progressively. Other bacteria produced harmful effects only in more conc. suspensions. Some spp. of bacteria, with sparse inoculation, were even beneficial to germination. Most of the moulds isolated were detrimental to germination and growth except some spp. of *Penicillium*. The most harmful was *Gibberella zeae*, which can certainly be regarded as the chief cause of coleoptile browning and dying-off of young barley plants. Its development was strongly inhibited by Hg dusting. Other injurious moulds were representatives of *Fusarium*, *Verticillium*, *Trichothecium*, *Cladosporium*, *Aspergillus*, *Epicoccum*, *Stemphylium*, *Syncephalastrum*, *Penicillium*, and *Mucor*. Dusting had the effect of increasing *Aspergillus* and *Penicillium* spp.: all other spp. were injured or eliminated.

Wahl (I.). **Studies on crown rust and stem rust on Oats in Israel.**—*Bull. Res. Coun. Israel*, Sect. D, **6**, 3, pp. 145–166, 1 map, 1958. [27 ref.]

It is reported from the Hebrew University, Rehovot, that recurring crown rust (*Puccinia coronata*) [**22**, p. 474] and stem rust (*P. graminis*) [**31**, p. 146] epiphytotics cause severe damage to oats in Israel. The 1st disease usually appears in Mar., the 2nd in Apr. Up to 150 vars., including many from abroad, were tested in the central coastal plain (Mikveh Israel), and in nurseries in different regions of the country. In varietal trials during 1951–56 the Brazilian var. Saia and the Minnesota selections II–47–12, and II–47–17 were very resistant to both rusts. The local oat selection Rehovot showed extremely high resistance to *P. coronata* under field conditions. The so-called Canadian factors for oat stem rust resistance were effective in all tests in the greenhouse and field plots at temps. below 28° C. The *P. coronata* races 264, 270, and 276 prevailed, the first 2 originating in Israel. *P. graminis* race 6 comprised about 97% of the identified isolates. There is a similarity of crown rust races predominant in Israel to those reported from Argentina [**37**, p. 405]. The importance of the ubiquitous wild oats (*Avenae sterilis*) in the dissemination of both rusts is emphasized. *Rhamnus alaternus* and *R. palaestina* [**22**, p. 474] play an important part in the life cycle of *P. coronata* in Israel and gave rise to race 270.

Romanko (R. R.). **A physiological basis for resistance of Oats to Victoria blight.**—*Phytopathology*, **49**, 1, pp. 32–36, 2 graphs, 1959.

A more detailed account of experiments already noticed on victorin, the toxin produced by *Helminthosporium victoriae* [**38**, p. 202].

Clark (R. V.). **Pathogenicity studies of isolates of Septoria avenae.**—Abs. in *Proc. Canad. phytopath. Soc.*, **26** (*1958*), p. 11, 1959.

Studies at the Botany and Plant Pathology Laboratory, Ottawa, on microspore, macrospore, and micropycnidial isolates of *S. avenae* [*Leptosphaeria avenaria*: **37**, p. 279] and on monomacrospore isolates from single oat leaf lesions indicated a wide variation in virulence, though there was no differential reaction amongst oat vars. The virulence of some isolates depended on the spore conc. of the inoculum, while others proved very virulent despite producing but few spores. Individual macrospores varied considerably in their dimensions.

Kirillov (Y. M.). Полегание Овса от стеблевой гнили. [Damping-off in Oats caused by stem rot.]—*Zashch. Rast., Moscow* [*Plant Prot., Moscow*], *1958*, 6, p. 56, 1958.

In a 3-yr. investigation in Estonia a widespread damping-off of oats at the milk stage was shown to be caused by a complex of fungi, the most virulent being *Fusarium* sp. Érban and Rokston proved the most resistant and gave the highest yields.

Minckwitz. **Beobachtungen anläßlich des Wiederauftretens von Zwergbrand an Roggen.** [Observations on the recurrence of dwarf bunt on Rye.]—*Pflanzenschutz*, **10**, 9, pp. 104–106, 3 fig., 1958.

Following a 2-year lull, an outbreak of *Tilletia contraversa* on wheat and rye is reported from several Bavarian localities [**38**, p. 77] in 1958, 8% of the ears being infected in a rye crop at Eggental. Symptoms on rye are described.

Taber (W. A.) & Vining (L. C.). **The influence of certain factors on the in vitro production of ergot alkaloids by Claviceps purpurea (Fr.) Tul.**—*Canad. J. Microbiol.*, **4**, 6, pp. 611–626, 2 graphs, 1958.

In further studies at the Prairie Regional Laboratory, Saskatoon, Saskatchewan [cf. **36**, p. 465], 18 of 41 isolates of *C. purpurea* produced detectable quantities of ergot alkaloids [**38**, p. 250], distinct strains being indicated but no correlation of quantity with host species or culture pigmentation. Commercial galactose containing glucose and lactose, but not purified, was the best C source, pure galactose mixed with pure glucose (but not pure lactose) also being effective. Ammonium succinate, soybean meal, urea, and yeast extract were the best N sources; L-tryptophane did not serve as such a source, but increased alkaloid production when added as a supplement. Succinic proved more suitable than a number of other acids for adjustment of the pH of the medium. The replacement culture technique of Abe *et al.* [cf. **35**, p. 719] did not hasten alkaloid production; this proceeded at a steady rate until the 43rd day, when it decreased markedly; organic N was excreted into the medium but not polysaccharide. Size of inoculum and the suspensory agent affected total yield and speed of alkaloid synthesis, but the number of times the inoculum was washed with saline made no difference. Production was very slow unless the inoculum was homogenized.

Săvulescu (T.). (Editor.) Монографический очерк Кукуруза. [Monographic study of Maize.]—926 pp., 28 col. pl., 181 fig., Academy of Science, Bucarest, 1957. [Review in Международ. с.-х. Журн. [*Int. agric. J.*], *1958*, 3, pp. 165–167, 1958.]

To this book, compiled for agriculturalists, plant pathologists, and technicians, A. Săvulescu contributes a chapter on physiological, virus, bacterial, and fungal diseases of maize, with detailed descriptions of each disease and indications of its distribution in the country. Resistant vars. and control methods are listed.

Cheremisinov (N. A.). Мичуринское учение в борьбе с болезнями Кукурузы. [Michurin theory for the control of Maize diseases.]—*Trans. Voronezh. agric. Inst.*, **26**, 2, pp. 130–146, 1956. [Abs. in *Referat. Zh. Biol.*, *1958*, 16, p. 208, 1958.]

Recommendations for the Voronezh region, U.S.S.R., for control of smut [*Ustilago maydis*: **37**, p. 473], dry rot [*Fusarium* sp.: **35**, p. 602], and black rot [*Xanthomonas stewartii*: **37**, p. 583; map 41] involve primarily selection (including grain from the top part of the cob) and intensive hybridization with at least 1 resistant parent, as well as regular P and K fertilization and other agrotechnical measures.

Russell (W. A.) & Hooker (A. L.). **Inheritance of resistance in Corn to rust, Puccinia sorghi Schw., and genetic relationships among different sources of resistance.**—*Agron. J.*, **51**, 1, pp. 21–24, 1959.

At the University of Wisconsin 6 maize lines, Cuzco, B 38, GG 208 R, K 148, P.I. 172332, and (A 277×41.2504 B)-1-271, were studied for inheritance of resistance to *P. sorghi* [**38**, p. 257 and below]. Tests of resistant×susceptible F_2 progenies with composite rust cultures and F_3 progenies with several individual cultures showed that the resistance in each line was due to 1 dominant gene. That these genes are different is indicated by a differential reaction of the 6 lines to a series of biotypes. The possibility of complementary genes with close linkage is discussed.

In resistant×resistant F_2 progenies, using a single rust culture, the genes governing resistance appeared to be either in an allelic series or to involve different closely linked foci. More detailed F_3 analyses of 3 crosses of 3 resistant sources showed that the genes governing resistance are in an allelic series or, if more than 1 focus is involved, there is probably less than 5% crossing over.

Syamananda (R.). **Physiological investigations with Corn rust: I. The influence of temperature and light upon rust development and the expression of resistance. II. The influence of carbohydrates on rust development and the effect of rust on the trend of oxygen take-up.**—*Diss. Abstr.*, **18**, 6, pp. 1958–1959, 1958.

The expression of resistance in maize to *Puccinia sorghi* [see above] may be changed by varying the environmental conditions, and work at the University of Wisconsin indicated that conditions both before and after inoculation affect the host-parasite relationship. In general, the host-fungus combination giving an intermediate rust reaction responded most readily to changes of temp. or light, whereas combinations giving reactions classed as highly resistant or highly susceptible were stable over the temp. range 16–28° C. Plants given supplementary light showed increased necrosis. High temp. (33°) and low light intensity prevented the further development of established infections, and in many inbred lines the full expression of seedling resistance was prevented at 28°. In one inbred line resistance was suppressed at 20–24°, but found expression above and below. Resistance in some mature inbred lines, susceptible as seedlings, broke down at high temp.

With a detached leaf culture technique infections developed best on 2% solutions of glucose, levulose (fructose), and sucrose, and poorly on galactose and cellobiose. Infections were occasionally established in etiolated leaf sections of inbred line B 14 floating on mannose solution, but not on xylose or sorbose: with the carbohydrates used there was no apparent correlation between rust development and the general physiological condition of the leaves. The action of mannose and cellobiose deserves further study.

There were no large differences in the type of uredial infection developing on leaves of an albino inbred line inoculated with different cultures of the pathogen and maintained in solutions of the various carbohydrates, though there were some variations in uredospore colour and the number of spores per pustule. The total

amount and the rate of O_2 uptake were higher in infected tissues than in healthy: the total O_2 uptake was higher in a resistant line than in a susceptible one whether or not the tissues were infected. Inoculation of the inbred line GG 208 R with a culture producing necrotic flecking led to a higher total O_2 uptake than inoculation with one inciting the fully susceptible reaction. In the summer, inoculation with the necrotic strain was followed, 10 days later, by a lower O_2 uptake than in healthy leaves.

Whitney (N. J.) & Mortimore (C. G.). **An antifungal substance in the Corn plant and its effect on the growth of two stalk-rotting fungi.**—*Nature, Lond.*, **183**, 4657, p. 341, 1959.

Further investigations at the Canada Dept Agric., Harrow, Ontario, were undertaken to ascertain whether or not young maize stalks contain substances inhibiting the growth of stalk rotting fungi [**37**, p. 381]. Stalks of 52-day-old maize (Pioneer 349) were cut into small pieces and frozen. An ether extract of sap obtained from these was assayed for antifungal activity by measuring its effect on growth of *Fusarium moniliforme* [*Gibberella fujikuroi*] and *G. zeae* on Czapek agar+extract for 72 hr. at 25° C. Growth of *G. fujikuroi* was inhibited by 45·6% and that of *G. zeae* by 22·5%. In 10 other lines of maize investigated inhibition of *G. fujikuroi* ranged from 56·5 to 63·9%. These results strongly suggest that stalks of young maize are not attacked by either fungus because of the presence in them of an antifungal substance.

Kryuger (L. V.) & Barkova (Mme T. A.). Некоторые данные о микоризе Кукурузы. [Some data on mycorrhiza in Maize.]—*Agrobiology, Moscow, 1959*, 1, pp. 137–138, 1959.

At the Permsk Agricultural Institute, Transural region, investigations of the roots of Sterling and Severodakotskaya maize at various stages showed that mycorrhiza [cf. **37**, p. 657] developed only at the 10-leaf stage in the subsidiary roots and not in the main or in the aerial roots. In plants with well developed mycorrhiza chlorophyll and transpiration were markedly higher and P uptake improved.

Tran-vy, Truong-van-Chom, & Bui-Duy-Tam. **Recherches expérimentales sur la toxicité du Riz parasite par le Penicillium citrinum Thom.** [Experimental researches on the toxicity of Rice infected by *P. citrinum*.]—Proceedings of the Symposium on Phytochemistry, Kuala Lumpur, December, 1957, Unesco Science Cooperation Office for S.E. Asia, pp. 178–180, [1958].

Experimental evidence is adduced demonstrating that rice plants experimentally infected by *P. citrinum* (Japanese strain) were non-toxic when fed to mice [cf. **38**, p. 82], and no mycelium was found in the organs after death. In a further experiment male rats were injected intraperitoneally with 5–15 ml. of methyl extract obtained from infected rice. After a few minutes of apparent intoxication the animals rapidly recovered. Rice grains infected by the fungus, though not injurious, are discoloured yellow which greatly reduces their market value.

Cunha (J. M. de A.) & Baptista (J. E.). **Estudo da branca do Arroz. I. Combate da doença.** [Study on straighthead of Rice. I. Control of the disease.]—*Agron. lusit.*, **20**, 1, pp. 17–64, 2 pl. (1 col.), 1958. [English summary, 7 pp. 23 ref.]

Straighthead of rice has been studied at the Estação Agronómica Nacional, Sacavém, Portugal, since 1955. The similarity of some of the symptoms of straighthead and those characteristic of Cu deficiency as it appears in reclamation disease of oats [**22**, p. 247; **27**, p. 69] suggested that both conditions might be due to the same cause. The results from analysis of the soil (determining Cu by Mulder's *Aspergillus niger* method) and of the plants indicated that straighthead is associated

with a deficiency of elements, especially Cu, which occurs in sandy soils subject to continuous irrigation. In addition to the usual P and N applied by local farmers (350–550 kg./ha. superphosphate and 200–350 kg./ha. ammonium sulphate) fertilizers including K, Mg, Ca, Fe, Mn, Cu, Zn, B, and Mo were added separately and in combination, with and without farmyard manure. In every one Cu at 100 kg./ha. markedly reduced straighthead, but in very poor soils Cu alone was not enough, only a combination of all the essential elements preventing its occurrence. It is concluded that besides the timely draining and drying of the soil generally recommended to control straighthead it can be prevented by adequate inorganic manuring [cf. **36**, p. 663], in which Cu plays an outstanding role.

Agarwal (G. P.). **An addition to the literature on sulphur and phosphorous requirements of fungi.**—*J. Indian bot. Soc.*, **37**, 3, pp. 375–379, 1958.

At the Botany Dept, Mahakoshal Mahavidyalaya, Jabalpur, *Curvularia penniseti* isolated from *Pennisetum typhoides* grew and sporulated better with $MgSO_4$ in the basal liquid medium than with any other organic or inorganic S compound tested, and KH_2PO_4 was the best source of P. The final pH showed a correlation with the fall in the dry weight of the mycelium at higher P conc.

Shinde (P. A.) & Bhide (V. P.). **Ergot of Bajri (Pennisetum typhoides) in Bombay State.**—*Curr. Sci.*, **27**, 12, pp. 499–500, 2 fig., 1958.

A description of the physiology and identity of ergot (*Claviceps microcephala*) [cf. **36**, p. 702] on bajri (*P. typhoides*), from the College of Agriculture, Poona, India. The morphology and measurements of the conidia, germination, and colour of stromata are similar to *C. microcephala* causing ergot in *P. hohenackeri*.

Klotz (L. J.) & DeWolfe (T. A.). **Twig die back of Citrus.**—*Calif. Citrogr.*, **44**, 3, pp. 99–100, 1959.

Extensive long term trials have been started in the Orange, San Bernardino, and Tulare counties, California, to determine whether fungicidal spraying would lessen the severity of the physiological disorder twig dieback [cf. **27**, pp. 561, 562]. From a preliminary trial in Tulare county, in which 6 fungicides were applied on 10 Nov. 1955 in an orchard of navel oranges with a history of dieback, it appeared that fungicidal deposits may increase the injury.

Bianchini P. (C. L.) & Wellman (F. L.). **Experimentos en el control de Pellicularia del Café y ciertas diferencias en Pelicularias de cinco huéspedes.** [Experiments on the control of *Pellicularia* of Coffee and some differences in *P.* spp. on five hosts.]—*Turrialba*, **8**, 2, pp. 73–92, 9 fig., 5 graphs, 1958. [English summary and abstract.]

At the Instituto Interamericano de Ciencias Agrícolas, Turrialba, Costa Rica, isolates of *Pellicularia koleroga* [cf. **34**, p. 721] from coffee were compared with others from cacao, *Hibiscus rosa-sinensis*, beans (*Phaseolus vulgaris*), and *Crotalaria anagyroides*. The last 2 had thicker hyphae than the others and were considered to be *P. filamentosa* [*C. solani*], while those from cacao and *Hibiscus* were specifically different from each other, with thinner hyphae, those of the latter being the thinner, and were not the same as either of the others. The *Hibiscus* isolate was parasitic on the coffee tree cricket *Idiarthron* (? *artrispium*). Cross inoculations combined with physiological studies confirmed that there were 4 spp. The coffee and bean isolates produced oxalic acid crystals in culture and in the tissues of diseased leaves.

In field tests fermate and orthocide 50-W, both at 3 l./100 gal. water, applied from July at 30-day intervals till the end of Nov., completely inhibited infection.

Triton B-1956 at 1 pint/100 gal., applied as above, gave 30% incidence. Tuzet at 574 g. in the 1st 2 applications, and 400 g. in the 3rd, and lead arsenate at 2 lb./100 gal., also applied only 3 times, completely arrested the disease but the former proved phytotoxic.

Tourjé (E. C.). **Camellia culture.**—xviii+471 pp., 9 pl. (3 col.), 56 fig., 8 diag., 2 graphs, 1 plan, New York, The Macmillan Company, 1958. $11.50.

Section VII (pp. 271–315) deals in detail with diseases and methods of treatment, with chapters by different authors on the history, symptoms, and literature of *Glomerella cingulata* [**33**, p. 724], *Sclerotinia camelliae* [**37**, p. 273], miscellaneous diseases, and variegation.

Moreau (Mireille). **La verticilliose de l'Œillet.** [Carnation verticilliosis.]—Reprinted from *Rev. Hort., Paris, 1958*, 2,223, 4 pp., 10 fig., 1958.

A popular account from the Muséum National d'Histoire Naturelle, Paris, of *Phialophora* [*Verticillium*] *cinerescens*, as it affects carnations [**37**, p. 481 *et passim*].

Hendrix (J. W.) & Hall (H. R.). **The relationship of certain leaf characteristics and flower color to atmospheric fluoride-sensitivity in Gladiolus.**—*Proc. Amer. Soc. hort. Sci.*, **72**, pp. 503–510, 2 fig., 1958.

Experiments at the State College of Washington, Pullman, in which pot plantings of 110 gladiolus vars. were grown in a locality with a fluoride-polluted atmosphere showed that the group most resistant to injury had leaves 7·5% longer, 3·5% wider, and 22% larger in surface area than the leaves of the most sensitive group. The 4th leaf from the base was always more sensitive than the 2nd. Groups with purple, lavender, red, pink, yellow, white, and orange flowers developed 33·2, 35·2, 39·9, 44·6, 46, 47·5, and 53·3% scorch [cf. **31**, p. 554], respectively.

Cole (H.) & Couch (H. B.). **Cytological investigations of Kabatiella caulivora.**—*Amer. J. Bot.*, **46**, 1, pp. 12–16, 4 fig., 1 graph, 1959.

In further work on the variability of *K. caulivora* [**37**, p. 731] from red clover initial growth on artificial media was characterized by budding, yeast-like, conidia, without mycelium, but after 14 days at 20° C. mycelial growth was macroscopically evident. Of 5,500 conidia from the initial growth 59 germinated by hyphae and the remainder budded, but of 5,000 conidia from mycelium, studied in successive, single spore transfers, all germinated by tubes. All conidia were multinucleate (1–8 per cell, av. 2·8). The observed variability in culture cannot be reconciled with the dual phenomenon [**17**, p. 830], but probably results from unidirectional mutation within the conidial growth form.

Posnette (A. F.). **The spread and control of viruses in fruit trees.**—*Sci. Hort.*, **13**, pp. 87–89, 1958.

In this paper, read at the Horticultural Education Association Conference, Sept. 1957, the author, after suggesting that 'mild' virus infections probably cause at least 10% loss of crop, describes the 3 degrees of severity of virus diseases of fruit: (1) acute, (2) chronic, and (3) latent. While virus free trees are preferable for planting new orchards, trees infected by selected mild strains, which protect them against infection by virulent strains, are probably better for filling gaps in existing orchards, though this procedure is still under investigation.

Brooks (R. M.) & Olmo (H. P.). **Register of new fruit and nut varieties. List 13.**—*Proc. Amer. Soc. hort. Sci.*, **72**, pp. 519–541, 1958.

This further list [cf. **37**, p. 359] includes the Jonadel apple, introduced commercially

in 1958, which keeps well in storage until March or later, has remained unaffected by Jonathan spot or internal browning, and is more resistant to fireblight [*Erwinia amylovora*] than Jonathan; the Blenril apricot (1957), demonstrated by indexing to be free from harmful viruses and which remained symptomless when inoculated with 3 strains of ring pox virus; the Alaling, Alamoore, Blackbeauty, and Ching Chow chestnut vars., resistant to blight [*Endothia parasitica*], the Graham filbert [*Corylus* sp.] (1957), resistant to blight [*Xanthomonas corylina*: cf. **32**, p. 704]; the Welcome gooseberry, relatively unaffected by anthracnose [*Pseudopeziza ribis*: cf. **25**, p. 171] and other diseases; the Cimarron grape, resistant to black rot [*Guignardia bidwellii*], and Early Niabell, Niabell, Royalty, and Rubired (all 1958), tolerant of powdery mildew [*Uncinula necator*]; Anthony hickory, relatively resistant to [unspecified] leaf spot; Lexington and Redbud nectarines (1957), showing considerable ability to escape from brown rot [*Sclerotinia fructicola*]; and Carrick (1957), Funks Colorado, Morgan (1957), and Pontotoc pears, resistant to fireblight.

Stojanović (D.) & Kostič (B.). **Prilog proučavanju vrsta Monilia na jabučastom i koštičavom voću.** [A contribution to the study of *Monilia* species in pome and stone fruits.]—*Zasht. Bilja* (*Plant Prot., Beograd*), *1957*, 44, pp. 69–72, 1957. [English summary. Received Feb. 1959.]

At the Agricultural Research Institute, Kragujevac, Yugoslavia, in 1955–6, of 1,075 isolates from fruit trees, 749 (from apple, pear, quince, plum, apricot) were identified as *Monilia* [*Sclerotinia*] *fructigena* [**37**, p. 541], 246 (from apple, pear, plum, peach, cherry) as *M.* [*S.*] *laxa*, and the remainder probably represented another biological form. In cultures of *S. fructigena* there was abundant formation of conidia and aerial mycelium, whereas in *S. laxa* these were poorly developed. *S. fructigena* also grew much more rapidly than *S. laxa*.

Ross (R. G.). **Effect of certain chemicals on the development of perithecia of Venturia inaequalis.**—Abs. in *Proc. Canad. phytopath. Soc.*, **26** (*1958*), p. 14, 1959.

The effect of the metallic salts of some elements occurring in apple leaves on the formation of perithecia of *V. inaequalis* [**37**, p. 89] in artificial culture was tested at the Plant Pathology Laboratory, Nova Scotia. Low conc. of $-NO_3$ nitrogen was inhibitory; $-NO_3$ in combination with Zn or Co resulted in synergistic inhibition. Other elements tested had no effect, except at high conc. Coumarin, *p*-dichlorobenzene, nucleic acid, and maleic acid hydrazide, which affect cell division, did not inhibit perithecial formation, but the last 2 compounds apparently inhibited the maturation of ascospores. Cinnamic acid and phloretin, also isolated from apple leaves, had little effect on perithecial formation.

Tanić (B.). **Prilog poznavanju porekla primarnih zaraza rote Šljive.** [Contribution to the knowledge of primary infection of Plum rust.]—*Zasht. Bilja* (*Plant Prot., Beograd*), *1957*, 43, pp. 97–106, 1957. [English summary. Received Feb. 1959.]

Investigations in Bosanska Krajina, Bosnia, Yugoslavia, showed that the 1st infection of plum rust (*Tranzschelia pruni-spinosae*) [cf. **37**, p. 539] was caused by aecidiospores, which developed on *Anemone ranunculoides* but not on other *A.* spp. In Banja Luka, at 145–165 m., aecidiospore dissemination lasted 19–27 days in the 2nd half of Apr. and 1st half of May, whereas at 720–760 m. it occurred 10–15 days later. Aecidiospore germination at 20° C. was 44·3%. The 1st outbreak of the disease occurred on 7 June. The pathogen does not overwinter on the branches of plum, peach, or apricot, nor in the fallen leaves. The incubation period *in vitro* at 12–18° was 15–18 days, at 20° 11 days, and at 25° 10–11 days, whereas under natural conditions it was 19–28 days.

Knight (R. L.) & Keep (Elizabeth). **Abstract bibliography of fruit breeding and genetics to 1955. Rubus and Ribes—a survey.**—*Tech. Commun. Bur. Hort. E. Malling* 25, 254 pp., 1 fig., 1958.

An annotated survey of literature, mostly published in 1900–55, on the breeding of currants, gooseberries, raspberries, blackberries, and hybrid berries. Most of the papers are summarized, some in considerable detail, and many relating to fungus and virus diseases are included.

Omčikus (Č.) & Blagojević (M.). **Neka zapazanja o simptomima mozaika na raznim sortama Smokve u Hercegovini.** [Some observations on the symptoms of mosaic in different Fig varieties in Hercegovina.]—*Zasht. Bilja* (*Plant Prot., Beograd*), *1957*, 44, pp. 27–34, 1 pl., 1957. [French summary. Received Feb. 1959.]

Investigations by the Mostar Agricultural Institute, Hercegovina, Yugoslavia, on the widespread fig mosaic virus [**32**, p. 574] showed that though fruit symptoms were present only in some vars. the disease was noticed in all the 41 examined. Three types of mosaic were detected, common mosaic, circular spots, and discoloration along the leaf veins; sometimes the 2 latter turned into common mosaic. Eradication of Vedonjaca vars. is recommended. The 2 vars. recommended for the district, the most resistant to the disease and the best for commercial purposes, are Bjeluša and Figue d'Or.

Sackston (W. E.). **Black root rot of Sunflowers in Uruguay caused by Sclerotium bataticola Taub.**—Abs. in *Proc. Canad. phytopath. Soc.*, **26** (*1958*), p. 14, 1959.

Dead sunflower plants, apparently affected by *S. bataticola* [*Macrophomina phaseoli*: **37**, p. 299] early in their development, were found in 25% of 117 fields examined in Uruguay in Jan. and Feb. 1957; only a few plants were affected in most fields, though 1–10% were in 5 fields. The symptoms were: stunted growth, blackish stems, and underdeveloped roots, dark externally and grey to greenish-grey internally, which can either become dry and brittle, or rotted and soft. Tests indicated that *M. phaseoli* was pathogenic in both stem and root inoculations, but the symptoms produced by the latter were more like those seen in the field.

This root rot of young sunflowers in Uruguay appeared to be of little economic importance, but a disease of mature sunflowers caused by the same pathogen and causing serious damage in Argentina is under investigation.

Hawkes (J. G.). **Significance of wild species and primitive forms for Potato breeding.**—*Euphytica*, **7**, 3, pp. 257–270, 1 diag., 1 map, 1958. [German and Dutch summaries.]

The subject is surveyed from an historical and evolutionary point of view and a plea made for closer inter-European co-operation in the use of wild potatoes. The pattern of variability in the tuber-bearing *Solanum* is reviewed.

Resistance genes (with a few exceptions) appear to be confined very strictly to 1 or 2 geographical areas, though present in several spp. there. Insect resistance seems to be much less specific than fungal resistance. The former is more likely to occur in areas of low rainfall.

In considering the geographical localization of genes determining resistance to *Phytophthora infestans* [**38**, p. 24], it is noted that *S. jamesii* and *S. fendleri*, occurring N. of the 23rd parallel, and strains of *S. demissum*, *S. ehrenbergii*, and *S. polytrichon* collected N. of this line are completely susceptible, whereas strains of the latter spp. from S. of this line seem to be completely resistant. The suggestion is made that field resistance might be found in the old land races of *S. tuberosum* cultivated for long periods in certain parts of Mexico; if so, they would provide a simpler source than *S. demissum* for transferring resistance to commercial vars.

As regards types of resistance to virus diseases and their geographical pattern, the American seedling 41956 [**36**, p. 779] possesses true immunity from virus X, based on 2 genes, thought to have been derived from a Chilean form of *S. tuberosum*, which figures in its ancestry. The single gene for immunity in *S. acaule* [**31**, p. 138] appears to be the only example of a resistance gene confined to one sp. in one area.

Genes for both immunity from and hypersensitivity to virus Y [**38**, p. 222] are localized in Mexico and Argentina [**30**, p. 240]. A very high grade of resistance is also seen in the diploid cultivated sp. *S. phureja*. Resistance to infection is also reported in *S. vernei* and *S. microdontum* (= *S. simplicifolium*), again from Argentina.

High leaf-roll intolerance is known only from Argentina and Bolivia. It has been demonstrated in *S. berthaultii* [**31**, p. 138] and in hybrids of *S. chacoense* × *S. tuberosum*. It still remains to be seen whether complete immunity exists.

Johansen (R. H.), Sandar (N.), Hoyman (W. G.), & Lana (E. P.). **Nordak and Norgleam, two new white-skinned Potato varieties with early maturity and field resistance to virus Y. Norland, a new red-skinned Potato variety with early maturity and moderate resistance to common scab.**—*Amer. Potato J.*, **35**, 12, pp. 774–777, 1958; **36**, 1, pp. 12–15, 1 fig., 1959.

These vars. were released by the N. Dakota Agricultural College, Fargo, on 1 Aug. 1957. The first 2 are susceptible to scab [*Streptomyces scabies*], late blight [*Phytophthora infestans*], and virus X, but possess a considerable degree of field resistance to virus Y. Norland is moderately resistant to *S. scabies*, but is susceptible to the common potato viruses and to *P. infestans*.

Chattopadhyay (S. B.) & Das (C. R.). **A survey of rugose mosaic and leaf roll virus diseases of Potato in West Bengal—in Plains.**—*Amer. Potato J.*, **36**, 1, pp. 16–21, 1959.

Following a general review of virus diseases of the major agricultural crops in W. Bengal (*Bull. bot. Soc. Bengal*, **9**, pp. 42–45, 1955) the authors undertook a survey of these 2 viruses in the winter of 1955–6. First infections of both were generally observed in the last week of Dec. or the 1st 2 weeks of Jan., according to locality and var., and the peak period of infection, lasting about 2 weeks, generally occurred 1–3 weeks after initial infection. The incidence of rugose mosaic [potato virus Y, often+virus X: **32**, p. 275; **38**, p. 271] was 0·14–14·5%, according to locality and var., and that of leaf roll [cf. **34**, p. 539] 0·14–1·7%. Yield losses were 20–76% and 41·3–73·3%, respectively.

Larson (R. H.). **Purple top hair sprout and low soil temperature in relation to secondary or sprout tuber formation.**—*Amer. Potato J.*, **36**, 1, pp. 29–31, 2 fig., 1959.

Investigations by the University of Wisconsin, Madison, indicated that in many early-planted potato fields in recent years non-emergence has been 4–9%. Such seed pieces, however, were usually firm with well-developed secondary tubers growing directly from the eye, but when planted in warm soil in the greenhouse they produced weak spindly hair sprout plants without sprout tubers. In a dark chamber at 12° C. a large percentage of spindle sprout tubers from Sebago infected by purple top (aster yellows virus) [cf. **37**, p. 552] produced small secondary tubers at the end of a very short sprout, whereas at 28° weak or spindle shoots developed. Likewise, when hair sprout tubers were planted at 12° secondary sprout tubers were formed, and at 28° weak, hair sprout spindle plants developed. Growers planting very early in the season in cold soil are therefore advised to move their seed stocks

to medium warm storage (68–72° F.) for 10–14 days before planting to induce slight sprouting and so permit roguing of all multiple sprout tubers and weak or hair sprout tubers.

Large (E. C.). **The battle against blight.**—*Agriculture, Lond.*, **65**, 12, pp. 603–608, 2 pl., 2 maps, 1959.

A general appraisal is made of the efficiency of forecasting and control in relation to potato blight [*Phytophthora infestans*: **38**, pp. 96, 222] in Great Britain. During the particularly severe blight year 1958 the worst damage was suffered by King Edwards in the Fens and parts of the W. Midlands. Owing to the heavy rainfall, protective spraying, especially by tractor, was frequently made difficult or even impossible by the ground conditions. In most blight years good commercial spraying will give about 2 weeks' prolongation of useful haulm growth, with gains of approx. $1\frac{1}{2}$–$2\frac{1}{4}$ tons/acre on 10–15 ton potential crops. This can usually be achieved, at any rate with Majestic, with 2–3 thorough, well-timed sprayings. Under 1958 conditions, however, more than the usual number of applications was required, and yet results were disappointing, especially with King Edward. Detailed study of the survey maps over a 10 yr. period suggests that protective spraying is worth while in 6–7 of 10 yr. in the Fens, almost every year in Devon, Cornwall, and the Welsh coastal areas, 5 of 10 yr. in most of the rest of the country S. of the Humber, and less than 1 in 10 yr. in most of the N.

Spraying may cause an average crop loss of 3% in all seasons by wheel damage, with a further 3% from Cu injury in dry seasons. Blight forecasts normally afford at least 10 days warning and serve to indicate the appropriate time for the important spraying for the protection of the whole of the foliage when the real attack begins. As little help can be gained from later forecasts, subsequent spraying should be undertaken according to the incidence of rain. Of the spraying materials used, Bordeaux mixture clearly affords longest protection under severe blight conditions. Zineb did better than was expected under the severe conditions of 1958. The Dutch now favour employing zineb first, then Cu [**38**, p. 222]. Air spraying is about equal to good ground spraying, though the best ground spraying is more effective. On the other hand, aircraft can work when the land is too wet for ground machines, and there is no wheel damage. Limited availability of aircraft at the right time may, however, be a serious disadvantage.

Wallin (J. R.) & Hoyman (W. G.). **Influence of post-inoculum air temperature maxima on survival of Phytophthora infestans in Potato leaves.**—*Amer. Potato J.*, **35**, 12, pp. 769–773, 1958.

As the result of an observation in 1954 that *P. infestans* severely damaged potato foliage in spite of exposure to air temps. of 98–100° F. 20 hr. after inoculation, this study was carried out by the U.S. Dept Agric. and the Iowa Exp. Sta., Ames, to determine the influence of temps. at or above the so-called 'lethal temp'. of 95° (cf. *Phytopathology*, **47**, p. 17, 1957) on the survival of the fungus in inoculated potato leaves.

Cultures of 5 strains of *P. infestans* were maintained on detached Red Pontiac potato leaves at 70–75° and 100% R.H. Inoculated plants (atomized) were held in a special chamber [**35**, p. 318] at 54–65° for 15 hr. and the temp. was then gradually raised to 105–115°, the length of the heating period depending on the max. desired, which was maintained for 30–60 min. In another experiment detached leaves incubated for 12 hr. at 58–65° were subjected to maxima of 83–108° 14–20 hr. after inoculation. The resulting area of leaf blight was assayed. The cultures varied somewhat in their response, but all survived 105° 22 hr. after inoculation, 106° at 27 hr. (though not, with 1 exception, after a shorter period), 108° at 43 hr., 109° at 45 hr., and 110° at 24 hr.; 3 survived 115° at 47 hr. In detached leaves the strains

varied in their tolerance of 105° but all survived this temp. 20 hr. after inoculation; none survived 108° at 18 hr.

Rodríguez (R. A.). **'Torbó', una enfermedad de las Papas que se presenta en Costa Rica.** ['Torbó', a disease of Potatoes which occurs in Costa Rica.]—*Turrialba*, **8**, 2, pp. 55–63, 9 fig., 1958. [English summary.]

This information on the disease, caused by *Rosellinia* sp., has already been noticed [**37**, p. 736].

Freshwater (I. T.). **More droopy top.**—*Cane Gr. quart. Bull.*, **22**, 3, pp. 104–105, 2 fig., 1959.

In the past few years droopy top of sugarcane [**35**, p. 791] has been recorded in several areas in Queensland. Small dark green patches in the leaves, which themselves are pale yellow green, are additional symptoms of Cu deficiency, the cause of the condition. $CuSO_4$ at 56 lb./acre applied to the soil, preferably combined with fertilizer, is the best treatment; as a spray it may cause severe scorching.

Eden (T.). **Tea.**—xvi+201 pp., 36 pl. (73 fig., 6 col.), 15 fig., 1 diag., 4 graphs, 1 map, London, New York, Toronto, Longmans Green & Co., 1958. 35*s*.

Chapter X (pp. 95–117, 29 ref.) of this textbook on tea in all stages of its production in various parts of the world is devoted to diseases—physiological, virus, and fungus—and their control [cf. **32**, p. 282]. 'Bitten-off' disease [**19**, p. 677], a physiological disorder, tea yellows [**12**, p. 537], caused by a deficiency, and phloem necrosis virus [**18**, p. 712] are described, and the fungus diseases of root, leaf, and stem, with detail according to their importance.

Orieux (L.). **Interim report on Tobacco diseases in Mauritius (1958).**—10 pp., Dept Agric., Mauritius, 1958. [Cyclostyled.]

During a preliminary survey of the incidence of tobacco brown spot (*Alternaria longipes*) [map 63], 1st reported in 1957, some of the tobacco diseases previously recorded in the island were observed and a number of new ones noted, namely *Ascochyta gossypii*, *Phyllosticta tabaci*, *P. nicotiana*, *Sclerotium rolfsii*, *Septomyxa affinis* [cf. **37**, p. 636], and possibly *Colletotrichum tabacum* [map 307] (symptoms resembling anthracnose observed in seedbeds in late July).

Granville wilt (*Pseudomonas solanacearum*), formerly an important disease locally, was observed only once, but in appreciable amount, following waterlogging. The standard locally bred vars. appear to be very resistant. Severe damage attributed to brown spot was in fact caused by frog-eye (*Cercospora nicotianae*). Later in the year this disease practically disappeared, especially in inland plantations, but it is considered by the author as the most damaging disease, both in field and barn.

Black shank (*Phytophthora parasitica* var. *nicotianae*), also once a major disease in Mauritius, is rare nowadays because of the great resistance of the commercial vars. Shot hole (*Phyllosticta nicotiana*), first mistaken for wind damage, has been since found in most plantations. Though considered a minor disease by Hopkins [**35**, p. 849], it caused severe damage at Choisy, in association with frog-eye. At l'Étoile leaf blotch (*P. tabaci*) was prevalent in a winter planting. The minute blotches enlarge and coalesce, and in the lower leaves large parts of the web may be killed and reduced to a mass of shreds. *A. gossypii* leaf spot was very conspicuous at Richelieu. Some infection by mosaic virus occurred, mostly in old plantations, but it appears that the prohibition of ratooning has removed the danger of severe losses.

Ismen (H.) & MacNeill (B.). **A study of the virus streak complex in Tomatoes.**—Abs. in *Proc. Canad. phytopath. Soc.*, **26** (*1958*), p. 12, 1959.

Some of this information from Ontario Agricultural College on tomato streak caused

by the combined action of strain PLL of tobacco mosaic virus and potato virus X has been noticed [**37**, p. 740]. Severity of the disease is influenced by the mineral nutrition of the host and the air temp. during incubation, the latter sometimes masking the effects of mineral nutrition, and even occasionally the presence of the viruses.

D'YACHENKO (N. I.). О повышении устойчивости Помидоров к мозаике и стрику. [On the increase of Tomato resistance to mosaic and streak.]—*Zashch. Rast., Moscow* [*Plant Prot., Moscow*], *1959*, 1, p. 54, 1959.

At the Gribovski Vegetable Selection Station, U.S.S.R., in 1952–58, tests of tomato vars. for resistance to [tobacco] mosaic [virus: **37**, p. 510] and streak showed that the northern vars. are much more resistant than southern. Growing plants at a low temp. in the greenhouse enhanced resistance. When seeds were soaked in 0·2% P, 0·2% K, and 0·005% Mn resistance was enhanced 2–2·5 times and yield increased 25–30%. Seed from such plants gave 66·7% healthy plants compared with 4·5% from ordinary seed. Applying 1% PK, 0·1% B Mg compounds and 'sheinite' [calcium compound] to the roots over several yr. also increased resistance. Good control was obtained when seeds were left for 48 hr. at 55° [C.], 1 hr. at 75°, 30 min. at 85°, or 15 min. at 95°, without ill effects on germination.

WAHL (I.), CHORIN (MATHILDA), & REICHERT (I.). **Late blight disease of Tomatoes in Israel.**—*Ktavim* (*Rec. agric. Res. Sta. Rehovot, Israel*), **9**, 1–2, pp. 153–166, 1 fig., 2 graphs, 1958.

Control of *Phytophthora infestans* on tomato in Israel [**34**, p. 112] is reviewed in the light of experience elsewhere. It has become a serious hazard since a most devastating epiphytotic in the winter of 1950–1, but the recurrence of the disease is somewhat sporadic and the need for a forecasting service is stressed. Under mild attacks fixed Cu [**28**, p. 91] and organic compounds offer equally good protection, but in severe epiphytotics the latter have proved superior. Phygon XL (0·25%) was very promising in several trials.

SCHULZ (G.). **Vergleichende Untersuchungen mit verschiedenen Stämmen von Lentinus lepideus, gleichzeitig ein Beitrag zum Soil-Block-Verfahren.** [Comparative investigations with different isolates of *L. lepideus*, a contribution to the soil-block method.]—*Holz a. Roh- u. Werkst.*, **16**, 11, pp. 435–444, 2 fig., 5 graphs, 1958. [English summary.]

At the U.S. Forest Products Laboratory, Madison, Wisconsin, 25 isolates of *L. lepideus* from the laboratory collection were tested by the American soil-block method [**38**, p. 168] and a number also by the German wood-block procedure (DIN 52176) [**36**, p. 506; **38**, p. 41], at the Institut für forstliche Mykologie und Holzschutz, Hann.-Munden, Germany, using heart wood of *Sequoia sempervirens*, larch, Douglas fir [*Pseudotsuga menziesii*], and *Pinus ponderosa*, and the sapwood of the latter. This provided a range from highly resistant wood to the easily destructible sapwood of *P. ponderosa*. On untreated wood the isolates showed considerable differences in destructive power. In general, where there was a medium destructive power on one kind of wood, there was a tendency to attack the others more strongly.

Comparison of the results obtained by the 2 methods showed that in general loss of wt. in untreated sapwood of *P. ponderosa* is comparatively low. The great difference in loss is due to the different techniques. The American method requires a temp. of 26·7° C., whilst the German prescribes 20°, and as the opt. temp. for *L. lepideus* is approx. 27°, wt. loss in the German process cannot be as high. Though the differences between the various isolates and 'types' are not so pronounced and often vary, certain similar tendencies can be detected.

In tolerance tests the preservatives used were creosote No. 41813 (Koppers Company), replaced by tar oil (in accordance with the prescriptions of the German Federal Railways) in the German test, pentachlorophenol, and Cu naphthenate. The isolates likewise showed great differences in their responses to impregnated wood. However, high capacity for destroying untreated wood does not necessarily infer high tolerance of preservatives.

Comparison of the fungicide threshold values of German tar oil (German test) and of American creosote (American test) also revealed considerable divergencies, which must be attributed to the culture temp. employed in the respective processes.

Most of the isolates were suitable for investigation of the natural decay resistance of wood as well as for laboratory preservative tests, though they showed considerable variation in mycelial growth, e.g. a 'cotton wool' type, a 'knotty' type, and a 'fine web' type, with intermediate forms. Colour, white or brownish, was also sometimes a distinguishing factor. Some strains showed a greater tendency to fruit body formation or to the formation of long needle-shaped crystals.

Verrall (A. F.). **Preservative moisture-repellent treatments for wooden packing boxes.**—*For. Prod. J.*, **9**, 1, pp. 1–22, 1 col. pl., 7 fig., 1 graph, 1959.

Tests are reported from the Southern Forest Experiment Station, U.S. Dept Agric., New Orleans, with 3,000 M22 small-arms ammunition shipping boxes, mostly of eastern white pine but some of aspen, yellow poplar, northern spruce, balsam [*Abies balsamea*], and hard pine. Treatment with 16 preservatives and 4 solvents was given during Apr.–July 1952. In addition the Forest Products Laboratory, Madison, Wisconsin, pressure-treated 221 boxes. Exposures were at Madison, Gulfport (Mississippi), and Fort Sherman (Panama Canal Zone), with the following av. rainfall and growing seasons respectively, 31 in., 171 days; 60, 276; 130, 365.

At Gulfport and Panama the moulds on boxes included *Pestalozzia* associated with a white moulding, *Aspergillus niger* on copper treated boxes, and *Penicillium*, *Trichoderma*, *Tubercularia*, and *Gliocladium*, but moulding and staining sufficiently severe to obliterate stencil markings occurred only on the untreated or on those given treatments ineffective against decay. The most common decay fungi on rain-wetted coniferous wood at Gulfport were *Lenzites saepiaria*, *Daedalea berkeleyii*, and, where in contact with soil, *Poria radiculosa* (common) and *P. incrassata* (1 pile); *Polyporus* [*Polystictus*] *versicolor* was common on hardwoods. The only identified basidiomycete that caused decay in Panama was *Odontia bicolor*, which was prevalent in 1954–5. In addition, an unidentified fungus with light tan mycelium was particularly destructive in a comparatively dry covered pile. A black wet-rot from which *Diplodia natalensis* was isolated was also common in Panama on wood too wet for rapid decay by most wood-destroying basidiomycetes. Often a thin shell of softened wood developed similar to the slow decay of saturated wood of cooling towers. At none of the test sites was there an apparent difference in spp. of decay fungi on treated and untreated boxes.

If av. service life is considered to end when 60% of the boxes failed, untreated eastern white pine, fully exposed to rain but protected from termites, lasted more than 5 yr. at Wisconsin and Mississippi and 3·2 yr. at Panama. Two spray coats of paint (TT-E-485b) inside and out reduced the av. decay rating after 5·1 yr.'s exposure in Mississippi from 3·9 to 3·2, and the failures from 61 to 21%, while covering prevented decay in untreated boxes during the entire exposure period except at the ground line. None of the woods commonly used for boxes and crates had sufficient natural decay resistance for long service when untreated and fully exposed in Mississippi. Eastern white pine heartwood had the slowest decay rate.

Boxes pressure-treated with pentachlorophenol and tanalith developed small amounts of decay during 5 yr. in Wisconsin, those given copperized chromated

zinc chloride or celcure remained decay-free. In Mississippi 1 box pressure-treated with pentachlorophenol failed from decay by *Poria radiculosa*. Except for this the pressure-treated boxes had only minor decay after 5 yr. The pressure treatments were in general more effective than dipping. In Panama most pressure treatments did not give better service than the best of the 3 min. dips. Inorganic salts generally caused softening at the surface, and after 4·5 yr. this extended to significant depths in many boxes. Those treated with copperized chromated zinc chloride were the last to develop softening and at the end of 4·5 yr. still had no failures.

In Wisconsin 6 dip treatments permitted only a few scattered decay spots during 5 yr.: copper naphthenate (1% Cu), 5% copper pentachlorophenate, 5% rosin amine D acetate, 10% copper ammonium fluoride, 5% *o*-phenylphenol, and 2% sodium pentachlorophenate plus 3% borax.

At Gulfport copper naphthenate (2% Cu), 5% copper pentachlorophenate, and 11·4% sodium pentachlorophenate gave the best protection to piles fully exposed for 5 yr. Copper naphthenate (0·5 and 1% Cu), 5 and 10% pentachlorophenol, 11% rosin amine D pentachlorophenate, 10% tetrachlorophenol, zinc naphthenate (2% Zn), and 5·7% sodium pentachlorophenate also gave good protection.

In Panama only copper naphthenate (2% Cu), 5% copper pentachlorophenate, and 10% tetrachlorophenol gave appreciable control for 4·5 yr.

Pentachlorophenol, 5%+ a water repellent, markedly reduced the decay rate of all the wood types on which it was tested. It was particularly effective on Douglas fir heartwood. The addition of repellents did not consistently or importantly affect decay rate, but was generally less effective on hardwoods than on coniferous. Preservatives in non-swelling solvents, as used in the present tests, are less effective against white rotters than brown; coniferous woods were rotted by the brown-rotter *Lenzites saepiaria*, the hardwoods by the white-rotter *Polystictus versicolor*.

Wood treated while green retained little preservative and decayed faster than that treated dry, particularly when the toxicant was applied in an oil solution. Partially dried and infected wood treated with the oil solution decayed at a significantly faster rate than uninfected wood at the same moisture content. This was not true when the fungicide was in water solution or when infected wood was fully air-dried before treatment.

Fungicides applied in a No. 2 fuel oil gave slightly more effective protection for 4·5 yr. than when applied in mineral spirits. The test data indicate that for long protection under tropical exposure, pressure treatment with an oil-borne preservative may be necessary. After 4·5 yr. in Panama no box with a retention of at least 4 lb. pentachlorophenol/cu. ft. had failed. Copper pentachlorophenate was difficult to handle and corrosive to metal; rosin amine D pentachlorophenate was slightly too corrosive in Panama; sodium pentachlorophenate alone or with borax was too corrosive, and pressure treatments with celcure and copperized chromated zinc chloride were too corrosive and did not afford water repellency.

Wire-bound crates of rotary-cut southern hardwood veneer decay so fast that it is desirable to treat them if outdoor storage beyond a few months in southern U.S.A. is contemplated.

Pound (G. S.) & Garces-Orejuela (C.). **Effect of photoperiod on the multiplication of Turnip mosaic virus in Rape.**—*Phytopathology*, **49**, 1, pp. 16–17, 1 graph, 1959.

At the University of Wisconsin, Madison, plants of Dwarf Essex rape were inoculated with the black ring strain of turnip mosaic virus [**17**, p. 151], exposed to photoperiods of 4, 6, 12, and 16 hr., and assayed (on tobacco) for virus conc. 7, 14, 21, and 28 days after inoculation. Virus conc. increased with day length and also with growth of the host [cf. **37**, p. 437].

Patino (G.) & Zaumeyer (W. J.). **A new strain of Tobacco-streak virus from Peas.** —*Phytopathology*, **49**, 1, pp. 43–48, 13 fig., 1959.

A more detailed account of the pea strain of tobacco streak virus described from the University of Maryland, College Park, and Beltsville [**38**, p. 36]. Of 46 spp. tested, 29 from 5 families were susceptible. The virus was inactivated after 27 hr. storage *in vitro* at approx. 22°. It was infectious for at least 98 days in dry tissue at room temp. [cf. **38**, p. 235].

MacNeill (B. H.) & Howard (Helen). **A Pea wilt disease new to Ontario.**—Abs. in *Proc. Canad. phytopath. Soc.*, **26** (*1958*), p. 13, 1959.

A wilt of peas, new to the Ontario canning areas where it is becoming prevalent, was determined to be the near-wilt disease (*Fusarium oxysporum* f. *pisi* race 2) [**38**, p. 345]. Diagnosis was based on the differential reaction of W. R. [wilt-resistant] Perfection and New Era peas, the vascular locus of infection, and the cultural characteristics of the fungus. Though very severe at high soil temp. (25–28° C.), in the Ontario region the wilt may be important even at 18–20°. Since soybean, garden beans [*Phaseolus* spp.], red clover, and lucerne proved to be symptomless carriers of the pathogen, its persistence is not likely to be affected by competition in the soil.

Chorin (Mathilda), Palti (J.), & Nitzani (F.). **Trials for the control of downy mildew on Onions 1953–1956.**—*Ktavim* (*Rec. agric. Res. Sta. Rehovot, Israel*), **9**, 1–2, pp. 139–145, 1 fig., 1958.

Four trials for the control of *Peronospora destructor* [**35**, p. 59] by chemical means were carried out in 1953–56 in the central coastal plain of Israel under conditions of severe mildew infection on onions of the highly susceptible Egyptian var. [cf. below]. Significant yield increases were obtained by the use of zineb fungicides dithane Z-78 and lirotan, which were consistently better than copper. Zineb sprays (0·11–0·17% active material) were superior to 7–10% zineb dusts. Treatment intervals of 7 days were generally sufficient, 14 days inadequate, but under conditions extremely favourable to mildew 3–4 days may be necessary.

Palti (J.), Chorin (Mathilda), & Nitzani (F.). **Survey of leaf and flower stalk diseases of Onions in Israel.**—*Ktavim* (*Rec. agric. Res. Sta. Rehovot, Israel*), **9**, 1–2, pp. 167–175, 2 fig., 1 map, 1958.

Peronospora destructor [see above], *Macrosporium parasiticum* [*Pleospora herbarum*: **35**, p. 59], and *Puccinia allii* [**18**, p. 204] were noted in a survey in 1952–55 of diseases affecting onions in Israel. The last was found in its aecial as well as its uredial and telial stages. Of the onion vars. surveyed, Egyptian was the most susceptible to *P. destructor*, Early Spanish less so, and Riverside least. No clear cut varietal differences were observed in relation to the other 2 diseases, which seem to be generally distributed throughout Israel. *P. destructor* is most severe in the humid parts of the Coastal Plain, the W. Negev, and on the shores of Lake Tiberias; elsewhere it is less severe or even rare.

MacLachlan (D. S.). **Virus diseases of Rhubarb in Ontario.**—Abs. in *Proc. Canad. phytopath. Soc.*, **26** (*1958*), p. 13, 1959.

Of 2 new viruses from rhubarb plants [cf. **33**, p. 402] in the Horticulture Division plots at Ottawa, rhubarb virus I produced severe mottle and rugosity on Ruby Red rhubarb, systemic mottling on tobacco, *Nicotiana glutinosa*, and *Datura stramonium*, and local lesions on *Vigna sinensis* and *Beta vulgaris*. Rhubarb virus II produced necrotic spots on Ruby Red rhubarb; symptoms similar to virus I on tobacco, *N. glutinosa*, and *D. stramonium*; and no local lesions on *V. sinensis* or *B. vulgaris*.

Kendrick (J. B.) & Middleton (J. T.). **Influence of soil temperature and of strains of the pathogen on severity of Verticillium wilt of Pepper.**—*Phytopathology*, **49**, 1, pp. 23–28, 1 fig., 1 graph, 1959.

In a study at the Citrus Experiment Station, Riverside, California, of the wilt of *Capsicum annuum* caused by *V. alboatrum* and widely occurrent in S. California disease severity was rated by a stunting index—the av. 4-week growth increment of control plants divided by that of inoculated plants. Inoculation was by dipping washed roots in a spore suspension and then replanting. Isolates from boysenberry, Icicle radish, chrysanthemum, strawberry, potato, stock [*Matthiola* sp.], rose, avocado, muskmelon, okra [*Hibiscus esculentus*], and tomato, in addition to those from capsicum, all produced micro-sclerotia and were similar in culture. Of the first 7 of these only those from chrysanthemum and rose were mildly pathogenic to Anaheim Chili pepper, with stunting indexes 2·2 and 2·3 (capsicum isolate 7·7). The other 4 were tested on Anaheim Chili and Jalapeno chillis and California Wonder sweet pepper. Whereas the capsicum isolate severely attacked all 3 (indexes 5·7, 4·3, and 3·7), the others proved only mildly pathogenic (max. 1·3). The former proved pathogenic to *H. esculentus*, but failed to attack Pearson tomatoes.

Max. growth of isolates from capsicum, avocado, *H. esculentus*, and tomato on agar in horizontal tubes occurred at 24°, the capsicum isolate growing rather more slowly than the others; all grew well over 12–30° but none below 9 or above 36°. Host temp. relations were observed on 6 vars. of chilli, pimiento, and sweet pepper types over soil temps. of 15–35° (5° increments) and at an air temp. of 24°. All vars. grew best at 30°, and nearly as well at 25°. There were varietal differences in response to temps. outside the opt. range. Under similar conditions the disease was severe at 15–30° soil temp., but decreased markedly at 35°, severity apparently being more closely associated with the growth of the pathogen than with that of the host. There were small differences in susceptibility amongst the vars. used, but no substantial resistance.

Blattný (C.) & Pilát (A.). **Viruses in Mushrooms. The possible existence of viruses in Mushrooms.**—*Mushroom News* (W. Darlington and Sons Ltd. Worthing, Sussex), **7**, 3, pp. 50–56, 1 fig., 1 graph, 1959.

The authors briefly review the literature on mummy disease of cultivated mushrooms, the symptoms of which suggest that a virus may be the cause [cf. **37**, p. 569], and various other abnormalities in toadstools that lend force to this suggestion are noted. Particular mention is made of a case of microcephaly of *Laccaria amethystina* (a note on which by J. Ramsbottom is appended) studied by Dr. Němec; 3 such specimens were ground and passed through a plaster filter and the diluted extract sprinkled over an area some distance from where they were collected: next year affected sporophores were found in both localities, which might indicate a virosis. There were significant differences in spore measurements of normal and microcephalous specimens.

Barra (I.). **DNRB-paszta alkalmazása a Szőlőperonoszpóra ellen.** [The use of DNRB paste against Vine mildew.]—*Kertész. szőlész.*, **7**, 4, p. 5, 1958.

In tests in Hungary in 1954–57, 0·4% DNRB (dinitrorhodanebenzene) paste was as good as 1% Bordeaux mixture for controlling vine mildew [*Plasmopara viticola*: **35**, p. 397]. The paste, however, has a short protective action, and where infection is severe must be applied more often.

Shterenberg (P. M.). Применение ядов против пятнистого некроза Винограда. [The use of toxins against spotted necrosis of the Vine.]—*Vitic. & Wine-Mak., Moscow*, **17**, 1 (168), pp. 30–33, 1957.

In the Ukraine and several adjacent regions of the U.S.S.R. to the S.E., during

warm damp winters, spotted necrosis, which may be caused by wood-staining fungi of the genus *Ceratostomella*, occurs on vines and infects cuttings in winter storage. In 1954, in experiments on treatment with various fungicides, the best results were obtained with 1% selinon which was 89% effective; 76% effectiveness was obtained with Paris green at 3%, 73% with 5% copper sulphate, and 70% with 20% ferrous sulphate.

Raykov (E. B.). Лупта ымпотрива некрозей ын Булгария. [The control of Vine necrosis in Bulgaria.]—Садов. Виноград. Винодел. [*Sadov. Vinograd. Vinodel.*], *1958*, 1, pp. 61–64, 1958. [Abs. in *Referat. Zh. Biol.*, *1959*, 4, p. 206, 1959.]

In tests by the Pleven Scientific Research Institute for Viticulture and Winemaking, Bulgaria, of vine planting stocks in the south of the country, where they are severely attacked by spotted necrosis [cf. **37**, p. 390 and above], it was found that dipping scions and seedlings for 15 min. in 0·25–0·5% granosan practically checked the disease; untreated material produced 85% infected plants. In well-aired storage rooms there was no necrosis, but with poor ventilation and 95–98% R.H., 10% of the plants became infected, and at —5 to+7° [C.] and high humidity incidence was 50–80%. The opt. temp. for the disease was below 0–8°. It is suggested that the low temp. weakens the tissues, which are subsequently invaded by the fungus [? *Ceratostomella*: loc. cit.] presumed responsible for the necrosis.

Usseglio-Tomasset (L.). **Alcuni aspetti del metabolismo della Botrytis cinerea e del Penicillium expansum vegetanti su mosto d'Uva.** [Aspects of the metabolism of *B. cinerea* and *P. expansum* growing on Grape must.]—*Ann. Sper. agr.*, N.S., **12**, 6, pp. 1689–1705, 3 pl., 1958. [English summary. 10 ref.]

A study at the Stazione Enologico Sperimentale, Asti, of the modifications induced in grape must by the growth of *B. cinerea* [cf. **35**, p. 73] and *P. expansum*, including an electrophoretic examination of the colloids produced by the fungi.

Stations fédérales d'essais agricoles, Lausanne. Rapport d'activité 1957. [The Federal Agricultural Experiment Stations, Lausanne. Report of work in 1957.]—*Annu. agric. Suisse*, (**72**, ed. fr. **59**), N.S. **7**, 4, pp. 256–574, 49 fig., 31 graphs, 2 maps, 1958.

In the plant pathology section (pp. 339–382) [cf. **37**, p. 261] it is stated that cereals throughout the country suffered the heaviest attacks of *Puccinia glumarum* so far recorded: for the 1st time teleutospores were noticed in abundance on winter barley in 2 localities. Apple and pear scab (*Venturia inaequalis* and *V. pirina*) were less severe than in 1956, but in orchards which had been neglected since the heavy frost damage of spring 1956 attacks were very heavy. *Podosphaera leucotricha* on apple was much more severe in orchards sprayed only with organic mercurials, i.e., receiving no S or Cu before blossoming. *Megacladosporium* [*Fusicladium*] *carpophilum*, severe on peach in Ticino, is spreading to areas previously unaffected. There has been a marked increase in the importance of *Clasterosporium carpophilum* on cherry, both on the Plateau and at Pied-du-Jura. *Cylindrosporium padi* [**38**, p. 155] is reported on cherry for the 1st time in French-speaking Switzerland, infection possibly being a sequel to the frost damage of the previous year. Raspberries throughout the same area were heavily attacked by *Didymella applanata*.

Tomatoes in the Valais region were frequently infected by *Phoma destructiva* and *Alternaria* sp. Many crops of densely cultivated beans [*Phaseolus vulgaris*] in Vaud were affected by *Ascochyta* sp. and *Sclerotinia sclerotiorum*. Onion stands at Vully were heavily attacked by *Sclerotium cepivorum*.

Early flights of *Myzus persicae* were followed by the early appearance of beet yellows virus, infection reaching 100% in certain exposed fields in the Wavre and Marin regions towards the beginning of Aug.

Six collections of *Tilletia caries* were divided into 2 races after testing on 12 wheat vars.: neither race corresponded to any of those described by Holton & Rodenhiser [**21**, p. 284]. The 1st was characterized by the susceptibility of Hybrid and Ulka and intermediate reaction of Hussar, Albit, Martin, and White Odessa, the 2nd (only 1 collection) by the resistance of all except Hybrid and Oro. At Chalet-des-Enfants *Septoria nodorum* caused a marked loss of yield of the susceptible wheat var. Capelle. The stalks of affected plants, weakened at the nodes, did not rise again when pushed sideways, and heavier losses are therefore to be expected when harvesting is done by machinery. The Beaumont scale was found adequate in practice for the determination of critical periods for *Phytophthora infestans* on potato.

Among the original publications (pp. 417–574) is a report by M. Ingold (pp. 445–456) that in a comparison of germination tests with maize the cold test [cf. **38**, p. 2] using sand (12° C. for 7 days followed by fluctuating temp. in the range 20–30° for 7 days) gave best correspondence with emergence in the field. The 'index of vigour' (V), obtained by the formula $V = \frac{G \times C}{100}$, where G is the result of the standard test (filter paper) and C that of the cold test, gave yet closer correspondence with field emergence.

From studies in the Valais region W. Wurgler & M. Staehelin (pp. 503–525) conclude that frost, pruning, spraying, and other agencies (e.g. ovipositor damage by *Ceresa bubalus* giving entry to *Leucostoma cincta*, or lesions of *Monilia* [*Sclerotinia*] *laxa* in the peduncles and branches) all give rise to tissue necrosis in apricot. Cambial activity is disturbed and it tends to form, in place of normal xylem, a spongy parenchymatous tissue in which gummosis soon occurs [cf. **36**, p. 37]. This reaction is particularly severe when Cu salts penetrate a fresh wound. The gum tissue in the callus thus formed round the area of necrosis may affect cambial activity in the following year, so contributing to the formation of cankers, which cause dieback of branches or entire trees.

R. Bovey (pp. 527–540), in an account of virus diseases of fruit trees in Switzerland [cf. **35**, p. 106; **37**, p. 288, *et passim*] reports that in 1956 at Grandson (Vd) about 10 Packham's Triumph pear trees bore, on certain branches, narrow fruits which remained green when the others were ripe, and which were often covered with rough brown spots: leaves were chlorotic, and the young branches tended to curve inwards towards the base, while the bark was more yellowish than that of healthy branches. The same symptoms have been seen in these trees in subsequent years, always on the same branches. The condition was transmitted by bark grafting to var. Curé. In 1955 a nurseryman reported several quince trees of the vars. Vranja, Bourgeaut, and Champion having more or less chlorotic foliage with small yellow-greenish spots over the entire lamina or sometimes localized about the veins. The branches were deformed in a manner recalling flat-limb in Gravenstein apple [cf. **34**, p. 230]. The condition was transmitted by bark grafting in the autumn of that year to Quince A, in which leaf, but as yet no branch, symptoms have been observed, and vigour is somewhat reduced. Young Louise Bonne d'Avranches pear trees grafted at the same time produced, on coming into flower in 1957, far fewer flowers than the uninoculated.

Report of the Waite Agricultural Research Institute, South Australia, 1956–1957.— 60 pp., 1 col. pl., [? 1958.]

Some of the information in the Plant Pathology section (pp. 36–40) of this report [cf. **36**, p. 454] has already been noticed. The following diseases were recorded for the first time in S. Australia: bacterial wilt (*Corynebacterium flaccumfaciens*) of beans [*Phaseolus vulgaris*], late blight (*Phytophthora infestans*) of tomato, downy mildew of cucumber (*Pseudoperonospora cubensis*) [map 285], and powdery scab

of potato (*Spongospora subterranea*) [map 34]. Clover anthracnose (*Kabatiella caulivora*) occurred in a few isolated areas in 1956, but not in 1957.

Studies by A. Kerr and J. Nath showed that 6 vars. of peas imported from U.S.A. were resistant to *Fusarium oxysporum* f. *pisi* race 2 but commercially unacceptable, while a var. which is resistant in New Zealand proved susceptible in S. Australia. Field and greenhouse studies have shown vapam to be effective in controlling root rot and wilt fungi of peas. N. T. Flentje and J. R. van Velsen identified 4 spp. of *Helminthosporium* causing root rot and leaf spot of cereals; none of the wheat vars. tested proved resistant to different strains of these, but different isolates of *H. sorokinianum* [*Cochliobolus sativus*] varied considerably in their pathogenicity. The severity of root rotting in wheat was affected by soil moisture, temp., and texture, while germination and formation of appresoria by *H.* conidia on the leaves of cereals was influenced by leaf exudates.

In studies of *Eutypa armeniacae* by M. V. Carter [**37**, p. 93] perithecia were also found on dead wood of almond and *Tamarix* sp. Ascospores were more prevalent in the air during spring and autumn than in winter. In investigation of virus diseases of vine by N. C. Crowley seedlings from *Vitis labrusca*, var. Duke of Buccleugh, proved excellent indicator plants; symptom expression was closely related to temp., complete masking taking place above 72° F.

Annual Report of the Department of Agriculture, Tanganyika, 1957 (Part II).—85 pp., 1 pl., 5 graphs, 1958.

In the section of this report [cf. **37**, p. 635] dealing with cotton diseases (pp. 45–48), M. H. Arnold describes further breeding work against *Xanthomonas malvacearum* [cf. **36**, p. 644]. *Fusarium oxysporum* f. *vasinfectum* was discovered in several new localities, on the coastal belt in Beita district and in 3 places on Kome Island.

E. A. Riley (pp. 72–74) reports from Lyamungu that new disease records for the Territory included zonate leaf spot (*Ascochyta phaseolorum*) of cowpea, gummy stem blight (*Mycosphaerella melonis*) of cucumber, anthracnose (*Glomerella cingulata*) of lupin, leaf spot (*Phyllosticta zeae*) of maize, basal stem rot (*Fusarium oxysporum*) of onion, pea blight (*Mycosphaerella pinodes*) [map 316], and anthracnose of soybeans (*Glomerella glycines*) [map 307].

Severe outbreaks of anthracnose (*Colletotrichum lindemuthianum*) of beans [*Phaseolus vulgaris*] occurred in the Mbozi area of Southern Highlands Province during Mar. 'Oily pod' [cf. **36**, p. 518], the origin of which remains unknown, again appeared in the Northern Province in May–June, and appeared to be confined to bean var. No. 62. Young citrus in the nurseries of the Sisal Research Station were affected by gummosis (*Phytophthora*, probably *P. parasitica*); the disease was previously ascribed to *Fusarium solani*, now regarded as secondary. Stem-pitting of coffee [**38**, p. 5] was recorded in all the main coffee-growing areas; only in a few cases was the condition followed by death or die-back. In preliminary greenhouse trials, Hg fungicides were more active against *Hemileia vastatrix* [cf. **38**, p. 293] than Cu or organics. A field trial with air-blast equipment showed that zineb and thiram were inferior to Cu as protective sprays. The number of sori present is lowest between the short and the long rains. *F. lateritium* var. *longum* [cf. **35**, p. 449] caused a die-back of 'leaders' of many coffee trees at Lyamungu.

F. oxysporum was isolated from wilted groundnuts from Handeni and Lupa Tinga Tinga, a new host record. A stem and leaf canker of groundnuts was caused by *Botrytis cinerea* [cf. **37**, p. 134]. Brown patch (*Helminthosporium cynodontis* [cf. **34**, p. 324] and *Corticium solani* [cf. **33**, p. 659]) was troublesome on golf courses turfed with *Cynodon dactylon* vars., particularly in Dar es Salaam and Moshi. Root rot (*Sclerotium rolfsii*) caused heavy losses of lucerne at the Tanga Dairy Farm after waterlogging during heavy rains. Cases of suspected 'lethal yellows' [cf. **35**, p. 366] of coconut palms occurred near Bagamoyo.

Anthracnose (*Colletotrichum tabacum*) [cf. **37**, p. 248] of tobacco was recorded for the 1st time in Tanganyika [map 307] in Dec.; the disease caused severe losses at Urambo and Lupa Tinga Tinga; zineb fungicides [**38**, p. 101] gave excellent control.

Rapport annuel pour l'exercice 1957. [Annual report for the year 1957.]—*Publ. Inst. nat. agron. Congo belge, 1959* (hors sér.), 529 pp., 1 map, 1959. 160 Fr.

In the section of this report [cf. **37**, p. 513] on the work of the Oil Palm Division, Yangambi Research Station (pp. 22–42), it is stated that studies in collaboration with the Division of Phytopathology showed that spraying twice monthly with a wettable powder containing 50% captan (0·5%)+0·2% adhesive gave good control of *Cercospora elaeidis* [cf. **36**, p. 100]. Against blast [cf. **37**, p. 733] suitable cultural practices in the nursery appear to be of primary importance.

In the section describing work on *Hevea* rubber at Yangambi (pp. 43–57), 5 applications of S at weekly intervals against *Oidium* [*heveae*] are stated to have given 12% increase in yield in plots tapped every other month from Nov., and 5% increase in those tapped in alternate months from Dec.

A new leaf disease of cacao, caused by *Colletotrichum* sp., is reported in the section on phytopathological work at Yangambi (pp. 109–117). There was lodging of oil palms 5–7 yr. old. A basidiomycete resembling *Fomes lignosus* in its vegetative appearance was found colonizing the roots of *Cynometra* spp., *Combretum oblongum*, and *Chrysophyllum lacourtianum* in competition with *F. lignosus*, *F. noxius*, and *Armillaria mellea*. Premature leaf-fall of *Hevea* rubber was caused by *Helminthosporium heveae* [cf. **36**, p. 309]. Maize leaf diseases (*H. turcicum* and other fungi) [cf. **37**, p. 514] were satisfactorily kept in check by spraying with 0·5% zineb at 65%, 10% phenyl mercuric acetate (0·2%) being added if spotting appeared after a few weeks.

In the potato collection plots at Ndihira Experiment Centre, Kivin Sector (pp. 441–444), the recently introduced vars. Vertifolia, Regent, Reaal, and Tedria were resistant to *Phytophthora infestans*. Tuber pieces used for 'seed' are highly susceptible to *Pseudomonas solanacearum* [cf. **37**, p. 447], especially var. Star.

Mulder (D.). **Plant diseases of economic importance in the Northern Region, United Arab Republic.**—*F.A.O. Pl. Prot. Bull.*, **7**, 1, pp. 1–5, 1958.

Observations in Syria indicated that the soils are commonly deficient in minor elements, including in many places Mg. Owing to the high pH value and the high lime content severe symptoms of Fe deficiency may occur, which could largely be corrected by planting a suitable cover crop and only irrigating when necessary. Symptoms of Zn deficiency and sometimes of B deficiency are seen in most fruit growing localities.

Peach yellows virus [map 60] was found for the 1st time in Syria at the Agricultural School, Kharabo. On plum trees were seen symptoms probably caused by prune dwarf, plum leaf roll [cf. **35**, p. 350], and bark split [cf. **37**, p. 242] viruses. Baladi apricots appeared to be almost completely infected by what was probably [peach] asteroid spot virus [cf. **29**, p. 33]; 3 other vars. also show infection. Cherry trees displayed mild symptoms of [peach] ring spot virus, high temps. probably preventing the development of distinct symptoms. Some cherry trees at Kharabo were affected by crinkle [cf. **37**, p. 488], and some Italian Gravenstein apple trees displayed mild symptoms of flat limb virus [cf. **37**, p. 171]. Fig mosaic virus [cf. **36**, p. 409] is probably universal. Almost all the mulberry trees examined showed veinbanding, the cause of which is under investigation. Some 'scaly bark' was present in citrus groves near Lattakia, apparently identical with that caused by psorosis B virus [cf. **37**, p. 477], though this was not confirmed.

Cucumber mosaic virus seriously reduced the growth of the squash crop [cf. **29**, p. 491]. On tomato the fern leaf symptom due to cucumber mosaic virus [cf.

37, p. 249] was noted only once. In most fields of Swiss chard round Damascus heavy infection by a mosaic virus disease occurred. Yellow spots appeared on the leaves, probably owing to insect transmission, and these were followed by the appearance of symptoms on younger leaves. Affected leaves were stunted and chlorotic, and became misshapen and inrolled. Some Cos lettuces near Damascus were dwarfed with vein clearing in the leaves, symptoms resembling those of big vein disease [cf. **37**, p. 621], whereas other dwarfed lettuces showed symptoms of lettuce mosaic virus.

Apple scab (*Venturia inaequalis*) and mildew (*Podosphaera leucotricha*) [map 118] occur only in the Zebedani valley. *Clasterosporium carpophilum* [map 188] was abundantly present on peaches, even in the dry zone near Damascus. Pear trees on the mountains near Lattakia are attacked by rust (*Gymnosporangium sabinae*); a species of *Cytospora* was isolated from dead bark of pears near Damascus. Pistachio trees near Aleppo were severely affected by *Phleospora pistaciae*; perithecia were found in fallen leaves in spring. Fig trees near Lattakia were defoliated early by rust (*Physopella fici*). Quince flowers in the Zebedani valley suffered severely from an attack by a *Sclerotinia* sp. before and during blossoming. Apricot trees were severely attacked by *Verticillium dahliae*, which caused partial wilting. Near Homs *S. cinerea* [*S. laxa*] was present on apricot trees; young almond trees were attacked by rust (*Puccinia* [*Tranzschelia*] *pruni-spinosae* [map 223]). *Uncinula necator* and *Plasmopara viticola* [map 221] were present on grapes, and *Agrobacterium tumefaciens* was commonly observed on vine stems.

Potatoes were badly affected by *Rhizoctonia* [*Corticium*] *solani*, found in all the principal potato-growing areas, *Colletotrichum atramentarium* [map 190], which attacks the stolons in particular and was especially severe round Serraya, and *Fusarium* tuber dry rot, which may be important; it seemed to follow stolon infection by *C. atramentarium*. Tomato plants were attacked to a limited extent by *Fusarium* root rot; *Verticillium* wilt was also observed.

The most important disease of wheat in Syria is bunt (*Tilletia caries*). Loose smut (*Ustilago tritici* [*U. nuda*]) is also present, but to a much less extent. Although the losses caused by these diseases were estimated to average 20% of the harvest no special measures have been taken to reduce them. Stem rust (*Puccinia graminis*) was found incidentally, but was of small importance.

Young poplar trees of the Hamwi type were found to be dying in 2 nurseries as a result of a bark rot near ground level caused by *Cytospora chrysosperma* [*Valsa sordida*: cf. **33**, p. 388; **37**, p. 604, *et passim*]. Poplar rust (*Melampsora pinitorqua*) often induced severe loss of foliage.

Baudyš (E.), Benada (J.), & Špaček (J.). **Zemědělská Fytopatologie.** [Agricultural Phytopathology.]—776 pp., 446 fig., Academy of Agriculture and the State Agricultural Publishers, Prague, 1958. Kcs. 71.50. [54 pp. ref.]

This well-illustrated book is the 2nd of 3 volumes (the 1st and 3rd yet to be published), the collective work of a number of Czechoslovak phytopathologists, intended for use in agricultural colleges.

It comprises sections on cereals compiled by V. Voříšek & J. Benada (pp. 28–220); root crops by Mme M. Drachovská-Šimanová & V. Vielwerth (pp. 222–370); legumes by F. Brückner (pp. 376–464); fodder and officinal crops by K. Rataj, Mme J. Nováková-Pfeiferová, F. Mráz, & V. Skalický (pp. 468–638); herbage crops by V. Zacha (pp. 642–683); and miscellaneous grasses by J. Drbal & J. Müller (pp. 686–741). Under each crop physiological, virus, bacterial, and fungal diseases are described in detail and there are indexes to common and latin names of hosts and pathogens.

Mallamaire (A.). **Catalogue des principales maladies cryptogamiques, bactériennes, à virus et des phanérogames parasites nuisibles aux plantes cultivées en**

Afrique Occidentale Française et au Togo. [A list of the chief cryptogamic, bacterial, and virus diseases and of parasitic phanerogams harmful to cultivated plants in French W. Africa and Togoland.]—*Bull. Prot. Veg.* (*Dakar*) *1956–57*, pp. 47–68, 1958.

This list, presented originally at the Congress on the protection of plants and their products in hot climates, held at Marseilles in 1954 [**36**, p. 382] covers the chief fungal, bacterial, and virus diseases of cereal crops and cassava, fruit, oleaginous crops, industrial crops (cacao, coffee, tobacco), and cotton in French W. Africa and Togoland. It is arranged under the headings: part attacked; class, family, and specific name of the parasite; and the nature and importance of the damage caused.

York (G. T.). **Field tests with the fungus Beauveria sp. for control of the European Corn Borer.**—*Iowa St. Coll. J. Sci.*, **33**, 2, pp. 123–129, 1958.

In experiments at the Entomology Research Division, U.S. Dept Agric., in 1955–6 with *Beauveria* sp. for control of *Pyrausta nubilalis* [cf. **31**, p. 552] sterile bran was used as the culture medium with a slightly modified version (using equal parts of bran and water) of the McCoy and Carver method [**21**, p. 253]. Spores thus obtained were then applied to maize plants in sprays, dusts, and granulated carriers, the last of 2 types, attapulgite 30–60 AA granules and maize meal, which was placed in an oven at 250° F. for 2 hr. to destroy moulds and other organisms.

In 1955 sterilized dry maize meal as a carrier of the spores gave an av. larval reduction of 91%, while granulated attapulgite gave 79%. Sprays and a dust produced appreciable mortalities but were not as affective as the maize meal. In the 1956 experiments maize meal as a carrier continued to produce somewhat higher mortalities than attapulgite granules. Increases in the amount of spores gave increases in control. Experiments for control of 2nd brood larvae were relatively ineffective in both years. There were indications that exposure to heavy concs. of *B.* spores may be injurious to man, and suitable precautions should be taken.

MacLeod (D. M.). **Amino acid nutrition of Hirsutella sp. isolated from the Spruce budworm (Choristoneura fumiferana (Clem.))**—Abs. in *Proc. Canad. phytopath. Soc.*, **26** (*1958*), p. 13, 1959.

It is reported from the Forest Insect Laboratory, Sault Ste Marie, Ontario, that a fungus isolated from spruce budworm and tentatively identified as *H. gigantea* [**35**, p. 33] could utilize a wide assortment of carbohydrates when grown in a chemically defined medium. L-glutamic acid was the only readily assimilated amino acid N source but good growth could only be obtained on it with a heavy inoculum (approximately 0·2%), which suggests a partial requirement for 1 or more unidentified growth factors.

Lembright (H. W.). **New uses of chloropicrin as a soil fungicide.**—Abs. in *Phytopathology*, **49**, 2, p. 113, 1959.

In California chloropicrin [**37**, p. 235] at 35 gal./acre injected 6–8 in. deep by tractor equipment with chisels 12 in. apart gave good control of *Verticillium* [*albo-atrum*] causing wilt of strawberries [**36**, p. 536] and also controlled root rots (*Rhizoctonia* [*Corticium*] *solani* and *Pythium ultimum* [cf. **35**, p. 31] associated with nematodes) and red stele [*Phytophthora fragariae*: **37**, p. 96]. Similar control of soil pox [*Streptomyces ipomoeae*: **38**, p. 31] of sweet potatoes by 10–15 gal./acre sometimes resulted in 1,000% increased yield, and 5–10 and 7–15 gal./acre have shown promise against scab [*S. scabies*] and *Verticillium* spp., respectively, on ordinary potatoes. Use of plastic covers is more effective than a water seal and reduces necessary dosages.

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